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ABSTRACT

This report addresses alternative means of interconnecting or providing access to the various automated systems within the 17-member North Bay Cooperative Library System (NBC), with emphasis on providing information on the availability of materials for loan, the principal objective of the NBC Telecommunications Project, Year Two. Advantages and problems of current circulation system databases are discussed, and a private network approach and a front-end translator approach are identified as two broad alternatives for solving NBC's telecommunication and access problems. Models for linking the existing automated systems in NBC via three private telecommunications networks (Doelz, Infotron, and DCA) and two front-end translators (IRVING and RTSS) are presented, and hardware, software and telephone configurations and costs are included for each model. A bibliography and a listing of projects and vendors identified as working on linkages between library automation systems are appended. (KM)

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North Bay Cooperative Library System

LINKING AUTOMATED SYSTEMS IN NORTH BAY LIBRARIES

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by

Janet Bruman
Telecommunications Project Director

September, 1986

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North Bay Cooperative Library System

LINKING AUTOMATED SYSTEMS IN NORTH BAY LIBRARIES

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North Bay Cooperative Library System

California

MEMBERS, JULY 1986

NBC Member Libraries:

1 Mendocino County (Ukiah)
2 Mendocino College (Ukiah)
3 Lake County (Lakeport)
△ (4) Sonoma County (Santa Rosa)
5 Santa Rosa Junior College (Santa Rosa)
(6) Sonoma State University (Rohnert Park)
7 Napa City-County (Napa)
8 Napa Valley College (Napa)
9 St. Helena Public (St. Helena)
△ (10) Solano County (Fairfield)
11 Travis Air Force Base (Fairfield)
12 Marin County/Civic Center (San Rafael)
13 Mill Valley Public (Mill Valley)
14 San Anselmo Public (San Anselmo)
15 San Rafael Public (San Rafael)
16 Sausalito Public (Sausalito)
17 Benicia Public (Benicia)

△ Headquarters

7/86

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LINKING AUTOMATED SYSTEMS IN NORTH BAY LIBRARIES

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PREFACE

The North Bay Cooperative Library System, established as a demonstration project in 1960, became one of the first of the California cooperative library systems in 1964. The cooperative currently serves seventeen members in six counties: Lake, Marin, Mendocino, Napa, Solano and Sonoma. The service area has a combined population of 1,059,400; the largest city is Santa Rosa (located sixty-five miles north of San Francisco) with a 1985 population of 99,691.

Public library members are Benecia Public Library, Lake County Library, Marin County Library, Mendocino County Library, Mill Valley Public Library, Napa City-County Library, St. Helena Public Library, San Anselmo Public Library, San Rafael Public Library, Sausalito Public Library, Solano County Library and Sonoma County Library. Non-public library members are Mendocino College, Napa Valley College, Santa Rosa Junior College, Sonoma State University and Travis Air Force Base.

Among the System programs are a Reference Center and ILL Department, both housed in the System Headquarters building in Santa Rosa. The System has a delivery van which provides regular service to each of the member libraries. A Reciprocal Borrowing Agreement between public library members permits NBCLS area residents to use any public library in the System. All of the public library members and most of the non-public library members have access to the OnTyme electronic mail service (through CLASS). Dial-up access to the public library member's circulation systems was begun in 1982, with a project named Intertie.

The Headquarters building also houses the System Technical Processing Center, which performs ordering, cataloging and physical processing of books for several of the System members. The Technical Processing Center uses an Innovacq Acquisitions system which is also accessible from remote terminals in the Sonoma County and Solano County libraries; cataloging and card production is done through RLIN.

The System is governed by a Board of Directors which is made up of the directors of each of the member libraries. The System is funded from a combination of Federal (Library Services and Construction Act), State (California Library Services Act), and local funds (service fees paid by member libraries).

Linking Automated Systems in NBC

The System received a Library Services and Construction Act grant for Fiscal Year 1985/86 to investigate telecommunications services for the member organizations. This report is the product of that investigation.

EXECUTIVE SUMMARY

The principal objective of the NBC Telecommunications Project, Year Two, has been to investigate alternative means of interconnecting or providing access to the various automated systems within NBC, and in particular to provide information on the availability of materials for loan. This report addresses that objective.

This study is based on the current automated systems in NBC public libraries: the four circulation system data bases, representing the holdings of eight members, and the acquisitions system at NBC Headquarters, used by three members.

The problems addressed in the study explore the now-limited use of Intertie (dial-up access to the circulation systems): only three of the data bases are now accessible; only four members are participants; hours and speeds of access are limited; procedures are cumbersome; long distance charges are high. Intrasystem use of electronic mail is minimal.

Within the current NBC membership there are fifty-one separate sites or facilities, including the branches and the system headquarters. Most of these already have a terminal or personal computer which could be used for access to the various data bases, if adequate communications paths or easier procedures were provided.

Developments occuring concurrently with the Telecommunications Project include a hardware and software upgrade to the Sonoma County Library Gaylord system, the drafting of search procedure manuals by the NBC ILL Committee and the newly-formed NBC CLSI Users Committee, and the reaffirmation by the NBC Board of Directors that all NBC members should be permitted and encouraged to use the circulation data bases for searches and for placing holds. (Production of a microfiche union catalog for NBC was approved shortly after the completion of this report.)

The report identifies two broad approaches to solving the telecommunications and access problems in NBC: a private network approach, and a front end translator approach. The private network makes use of sophisticated data communication transmission and/or switching equipment, to replace or enhance the existing connections between terminals and hosts. Advantages of the private network include: expanded access to more locations; use of a single workstation for all hosts; reduction and control of telecommunications costs; capacity for future

growth. The front end translator uses an additional computer (minicomputer or microcomputer) and software to provide a common access procedure for diverse circulation systems. Advantages of the front end translator include: reduced training required for access procedures; elimination of need to re-key a search; retrieval of shelf status information; retention of local control over the circulation system.

Other possible approaches are given but are not presented in detail. None of the approaches can offer a universal solution to all of the telecommunications and access problems. The choice of an appropriate solution is dependant on which problem is seen as having the highest priority.

The report includes five models or case studies for linking the existing automated systems in NBC. All but one of the models are based on currently-available products. Three (Doelz, Infotron, DCA) are for private telecommunications networks. Two (Irving, RTSS) are for front end translators. Hardware, software and telephone line configurations and costs are presented for each model.

An Appendix lists projects and vendors who are working on linkages between library systems, who were contacted during the course of the NBC Telecommunications Project.

LINKING AUTOMATED SYSTEMS IN NORTH BAY LIBRARIES

DESIRABILITY OF ACCESS TO NBC CIRCULATION SYSTEMS

A principal objective of the NBC Telecommunications Project, Year Two, has been to investigate alternative means of interconnecting or providing access to the various automated systems within NBC, specifically the existing circulation systems and the Innovacq acquisitions system. Such access is desirable because it provides information on whether a specific title is owned and is available for loan at an NBC member library. Earlier studies conducted in NBC and elsewhere have proven that shelf availability data results in higher fill rates and shorter turnaround times for ILL; this translates into better service to the library patrons and improves efficiency for ILL staff, because each request is handled fewer times.

While only seven of the twelve public libraries in NBC are represented in the circulation system databases, there are still significant advantages to using these databases as ILL sources:

* the libraries with circulation systems include the principal resource collections for the region

* the circulation system databases tend to be more accurate and up-to-date than the RLIN or OCLC databases, since there is not the same negative financial incentive to enter withdrawals

* there is no per-use charge for searching the databases or for requesting loans

* knowing which library has an item on the shelf allows the requestor to distribute requests more evenly among lenders

* by requesting items that are known to be available, handling of reserves is reduced and turnaround time improved

* placing of holds directly by the requestor reduces the workload for the lending library staff

The ILL borrowing patterns within NBC reflect these advantages: as a group, the eight libraries whose holdings are accessible online supplied 92.5% of the titles loaned in the system in 1985/86. These same seven libraries borrowed only 73.6% of the books loaned within the system. These statistics are an

incentive to add the other NBC holdings to a circulation file and thereby share resources more equitably.

PROBLEMS WITH EXISTING ACCESS METHODS

Within the current NBC membership, there are fifty-one separate sites or facilities (including the system headquarters). Nineteen of these are libraries or branches who have no access or connection to any of the automated systems in NBC. These include Mendocino County (3 sites), Mendocino Community College, Lake County (4 sites), Santa Rosa Junior College, San Anselmo Public Library, San Rafael Public Library, Benecia Public Library. There are also four branches of the Sonoma County Library and three of the Marin County Library which are not served by their circulation systems. Most of these institutions already have some sort of computer terminal or PC in use for other purposes, which could be used for access to the various systems if adequate communications paths and/or easier procedures were provided.

From 1982 (when the INTERTIE project was initiated) until 1986, access to the circulation systems within NBC has been quite limited. Only three systems were being searched remotely (Napa, Marin and Solano); Sonoma County's dial-up port was discontinued, because the earlier software could not support author/title searching. Searching is done through dial-up ports, using dumb terminals and very low speeds (300 bps). Only a few libraries have access or the training needed to perform it, and even these restrict access to the ILL department. Public service staff and branches have no way of determining whether a neighboring NBC library has a book available.

Concerns over competition for the limited hours of access, high long distance charges, slow access speeds and cumbersome procedures keep many NBC libraries from participating. These same considerations of complex procedures and high long distance charges affect many NBC libraries when accessing the nearest Uninet or Tymnet nodes (used for electronic mail and other information services).

NBC members would like to increase resource sharing with Sonoma State University, but access to their CLSI system may not be possible for some time. (There is no direct-dial port available on their host and there is resistance from the campus computing center and faculty to providing one for "outsider" access.)

PROGRESS IN 1986

Efforts to improve remote access to the circulation systems have now begun from several directions. Sonoma County is installing a Gaylord system upgrade that will provide a dial-up port and improved search capabilities. The ILL Committee and a newly-formed NBC CLSI User Group are collecting data that will become documentation for searching the circulation databases. Other ILL staff are investigating new ways of using the circulation systems that could improve efficiency. The Board has re-affirmed that any NBC library who wishes to search the circulation databases should be permitted and encouraged to do so. [Note: Shortly after this report was completed, the NBC Board voted to create a union fiche catalog for the cooperative, from the holdings records in RLIN.]

CURRENT TELECOMMUNICATIONS EXPENDITURES

A first step in the investigations conducted by the Telecommunications Project has been to determine how much is currently being spent on communications in support of the circulation and acquisition systems. This information provides a baseline to be used as one criterium for comparing alternate telecommunications technologies. The information also gives an indication of what funds might be re-directed towards alternate systems.

Because of the limited time and staff available for the investigation, some of the current expenditures had to be estimated. These estimates were based on brief survey periods and on data supplied by the member libraries. In most cases, actual telephone bills were not available for examination. The annual expenditures identified included:

a. Leased lines for circulation systems	$ 48,876
b. Leased lines to remote Innovacq terminals	5,592
c. Long distance to circulation systems (Intertie)	6,000
d. Long distance to OnTyme	1,800
TOTAL	$ 62,268

(More detailed identification of items A - C is included in the Tables, A - C.)

FUTURE GROWTH

Plans for growth (added terminals or sites) have not been formalized for most of the circulation systems in NBC, perhaps because so many of them have been involved in expansions in 1986. Current and projected transaction loads are an important factor also. More detailed information needs to be collected on this subject.

The geographic area covered by NBC includes some of the fastest-growing areas in California. The anticipated population increase will undoubtedly cause pressure on many NBC libraries to expand their operations, and therefore require additional circulation system terminals. This will impact both leased-line costs and capital expenditures for multiplexing equipment. No estimate is available of the projected increase in these costs.

The most immediate growth will probably occur in Intertie ILL use as more NBC libraries begin to use the dial-up access ports. Under current procedures, this will cause a significant increase in expenditures for long distance charges, perhaps by as much as 100%. (See Table D for an analysis of projected costs). Intra-system ILL traffic increased by 24% in FY 1985/86, if this growth rate is maintained the costs will increase even more than what is shown in the Table.

There also has been inadequate investigation of the possible addition or expansion of other automated systems in NBC. An example of this would be the use of Innovacq by other libraries or for other purposes, such as collection development. NBC members may add still other systems in the future; these need to be taken into consideration in the planning process.

AVAILABLE SOLUTIONS: TWO APPROACHES

There are only a limited number of technological solutions available for the main system interconnection problems NBC has identified: rising telecommunications costs and cumbersome access, search or requesting procedures. Contrary to some expectations, none of the currently-available products provides an ideal solution: one that addresses every problem. Expectations, of being able to use a uniform command structure to manipulate multiple hosts and data bases over a single telecommunications path, have been raised by reports on the LC/RLG/WLN/OCLC Linked Systems Project and by the release of the Oklahoma Department of Libraries' guidelines for library linkage.

Linking Automated Systems in NBC

Investigations by the Telecommunications Project have found that many of the efforts now underway around the country to "link systems" are considerably less ambitious than their project names might imply. Most of the projects which are operating now are only linking one kind of local system, or rely on a single central database host, or provide communications access but no uniform command structure. Many other projects are still in the planning or development stages. (A list is provided in the Appendix.)

There are "system linkages" solutions that address one or the other of the two major problem areas (communications costs and cumbersome procedures). These solutions can be grouped into two broad catagories:

1. Telecommunications networks -- sophisticated transmission and/or switching equipment, which replaces or enhances the existing connections between terminals and hosts. Implementation of certain of these systems could reduce or control telecommunications costs and make access procedures simpler; these networks would have little or no impact on searching or requesting procedures. A number of vendors supply such communications hardware; at least two, Doelz Networks and Infotron, have experience with library consortia very similar to NBC.

2. Front end translators -- micro or mini-based software that provides a "universal" command structure for multiple host systems. This type of software can significantly improve on many existing access and searching procedures, but will have a negative impact on telecommunications costs. Only two such systems exist now, IRVING and RTSS; the latter is still under development.

The lack of an existing product that provides a solution to all problems does not necessarily mean that NBC should reject all of the products, although there is nothing inherently wrong with maintaining the status quo until a more comprehensive solution is found. What it does mean is that each product should be examined for its ability to adapt over time and its potential for integration with future systems. Such a cautious and conservative approach is justified further by the not-yet-completed research and development work being done on standards for system interconnection and internetworking protocols.

In the following sections, the advantages and disadvantages of each of these two broad catagories will be examined more closely.

The Models give detailed "scenarios" of specific vendors and products, with cost estimates for installing them in NBC.

THE PRIVATE NETWORK SOLUTION

One approach to the current problems would be to install a single, unified telecommunications network, owned and operated by NBC. Running a private network means that you have control over where lines are routed, what locations "share" a line, what switching and testing equipment are connected, and many other factors. This level of control allows the network design to be optimized for your specific needs, rather than the preferences of the telephone company or the circulation system vendor. In many cases lower operating costs may be achieved as well.

Having access over a private network would eliminate what are now confusing access procedures and prohibitive long distance charges to access the various automated systems within NBC. Such a network could provide communication channels for all of the fifty-one service outlets in NBC. While some of the sites, particularly the branches, are so small that it might not be practical to provide anything other than dial-in access to either their own or others' circulation systems, even this would be a significant improvement in service since they have no such access now.

Private networks are expensive undertakings, and it is doubtful that the overall cost of telecommunications could be reduced very much from what NBC members are already spending. However, installation of a private network would allow these monies to be spent in a far more effective manner. For an equivalent annual expenditure on telecommunications, service could be enhanced in the following ways:

1. Expand access to institutions and/or locations not now participating in circulation systems or INTERTIE.

2. Allow inter-connections to all NBC databases from one workstation.

3. Eliminate long distance dial-up charges (and the consequent strong deterrent to use any of the online systems).

4. Make shelf-status information for other systems available directly to the branch librarians (thus reducing the load on central ILL staff).

5. Encourage non-ILL use of circulation and Innovacq databases (i.e., checking for current acquisitions, cooperative collection development, last-copy discards, subject access).

6. Create an electronic data path that could be used to provide access to any future systems added by NBC.

It is possible that some configurations of hardware and software on a private network could also serve as a partial replacement for commercial electronic mail service (OnTyme) for intra-system use; this would represent an additional savings to NBC libraries. OnTyme or another nationwide electronic mail service would still be needed for access to non-NBC libraries. Some private network products could offer additional benefits, such as: more reliable and higher speed access to the local host, and the option to add more circulation terminals without adding more host ports and with almost no added communications cost. These benefits would increase over time.

In order to be effective, such a private telecommunications network would require strong centralized administrative control. Responsibility for network planning, equipment purchasing and maintenance, telephone line installation, billing and monitoring, user training and support, and day-to-day operations can not be delegated to a committee or shared among staff at numerous institutions. Permanent staff would be needed, as well as a strong multi-year commitment to continued participation and funding by NBC members.

In return for this commitment, the member libraries would have a guarantee of telecommunications service at the best available prices, the benefit of in-system technical expertise, and freedom from the burden of doing their own maintenance or trouble-shooting. They would be able to better predict and control their individual future telecommunications expenditures, and would know that the network was available to support whatever future online systems they needed to access.

The private network option should not be seen as just a lower-operating-cost substitute for current operations. Instead, NBC must plan it as a means of expanding service to libraries and branches that are currently not able to fully or easily participate in NBC programs. This might require a network configuration that is more extensive than some of those outlined in the attached case studies. The real advantages of these systems to NBC and to its member libraries would only be realized

if they are looked at in terms of anticipated or desired growth in the use of the automated systems over the next several years.

THE FRONT END TRANSLATOR SOLUTION

Another approach to the multiple-host problem concentrates on the search procedures and the user interface rather than the telecommunications access or channels. This view concentrates on the applications or functions being performed by staff, rather than the hardware. Because this is a far more difficult and complex approach (and one that, unlike the telecommunications networks, has potential sales in only a very tiny market--libraries), there are fewer product choices available. Only two products have been identified that attempt to provide a solution of this type: the IRVING project, which originated in a group of Colorado libraries some years ago, and the Regional Telecommunications Support System (RTSS), which the California State Library has been sponsoring since 1984. Both the IRVING and the RTSS projects have developed software that resides on a separate computer from the host, and translates the user's input into language acceptable to each host.

The IRVING project chose to carry the idea of a front end system to the fuller extent. IRVING (which is now commercially available through Minicomputer Systems, Inc.) translates both the user's input and the host's output into a common format, and provides on-screen menus and help functions that almost eliminate the need for training. It is an interactive system -- the user is online to the host, and receives immediate responses. IRVING uses DEC MicroVAX computers.

The RTSS project (which is still under development and whose future commercial availability is uncertain) takes a much more limited approach. RTSS translates only the user's input; the host's output is not altered and so must still be understood and interpreted by the user. RTSS does not allow actual online access to the host -- searches are batched and results delivered a few minutes later. RTSS operates on IBM PC/AT microcomputer hardware.

A front end approach to multiple-host access offers several benefits to the libraries involved in such activities:

1. The common command language or menu structure eliminates training on different host systems.

2. Automating access to the hosts reduces the need for training on communication hardware and protocols (dialing instructions, terminal settings, etc.).

3. Re-keying of the same search into multiple hosts is eliminated or reduced.

4. Shelf status data is retrieved automatically for each search.

5. Each library retains complete autonomy over their own local automated system.

With a front end interface the ILL staff can concentrate their efforts on the aspects of their job that require judgement, and be freed from memorizing complicated but mechanical routines. The time required to train new or substitute staff (or the staff of neighboring libraries) should be cut significantly. The ease of use of these systems should reduce errors, and thereby improve productivity and job satisfaction levels.

The front end interface solution is a way of providing uniform procedures for access to shelf status data throughout NBC. Implementation of such a system allows each library to select the local system most suited to their needs, without sacrificing compatibility with other NBC systems. Each library also retains control over its choices for telecommunications between their host and branches. The translator removes the technical or procedural barriers that might result from having disparate local systems within the cooperative.

A major difference between the front end translators and the private telecommunications network is the "hands-off" posture towards the existing local systems. Since there is no actual entry allowed to the host systems, the integrity and security of the host is maintained. The front-end interfaces also avoid any changes to the existing communications facilities, particularly those between each host and its branches. Both Irving and RTSS could be expected to increase current and future telecommunications costs.

Unlike a private telecommunications network, these front end systems do not need to be installed throughout NBC in order to be effective, and they do not need to be installed on all of the hosts at the same time. Many of the benefits listed above could be realized even though only selected NBC hosts were accessible via the interface. More hosts could be added over time.

There are also disadvantages to this applications-oriented approach to accessing multiple hosts. All such software packages will need to be constantly monitored and upgraded to maintain compatibility with any enhancements to the existing host systems. Additional programming will be needed to install interfaces to any new systems that NBC acquires in the future. This means ongoing high level programmer support from the vendor will be essential, since such expertise probably can not be developed in NBC. Some centralized administrative support would be needed from NBC, for billing and for user support, although far less than for a private telecommunications network.

Other disadvantages include the requirement for additional, new workstations at the central libraries: dedicated network terminals for IRVING and IBM PC/AT's for RTSS. Staff would probably not be able to conduct searches of other hosts from the same terminals they use for entering transactions on their own local circulation system.

OTHER SOLUTIONS, OTHER PROBLEMS

The two approaches, private telecommunications networks and front end translators, described above and in the Models, have been the focus of investigation by the Telecommunications Project but they are not the only courses of action available. They are also necessarily mutually exclusive. There are a number of other approaches and combinations of technologies which NBC could investigate. Which is "best" will depend on what application or problem NBC decides is the most important. It may be helpful to look briefly at a few of the choices here.

For instance, the procedures for dial access and the desire for multi-function workstations may be seen as the most important problems to be addressed. Reducing reliance on leased-lines could be a priority. Simple, uniform and efficient search procedures might be more of a priority than having shelf status information. Still another priority might be reducing the staff time required to place holds and process loans.

Simplified dial access and multi-function workstations can be achieved by a combination of "off the shelf" hardware and software products. For instance, the libraries with CLSI systems might find that the Datalink software is appropriate for these limited aims. It would allow their CLSI terminals to connect via an out-dial modem to any remote host simply by choosing that host from a menu; the software sets the protocols and dials the

number. However, Datalink is expensive and does not provide any assistance to libraries who are not part of a CLSI system.

Simplified dial access and multifunction workstations can also be achieved through the use of personal computer hardware and software. Some of the electronic mail and bulletin board software packages could reduce NBC's use of OnTyme electronic mail services. However, to be effective, the choice of such products whould be standardized throughout the cooperative. This would mean discarding or re-configuring many of the packages already acquired and in use in NBC libraries. Reliance on personal computer-based systems would also require that expert staff be available to handle installations, training and other services. This expertise is not currently found in NBC.

Reducing reliance on leased lines would call for either standalone systems that do not use remote terminals, or substitution of microwave and radio transmission. These two other transmission methods have not been investigated in detail as part of the NBC Telecommunications Project. The University of California is currently involved in a study of the potential of packet radio for library networking in California. Because of the large number of widely dispersed sites in NBC the design and implementation of the necessary equipment would be an enormous task. NBC would need to coordinate and cooperate with other local government agencies for the use of sites, as the cost of commercial sites would be prohibitive. It might be necessary to use several vendors in order to get the kind of coverage and access NBC needs. Such non-wire-based systems would require far more administrative and technical support than a private leased-line based network. However, they offer the greatest promise for reducing telecommunications costs.

Union catalogs can address the problems of uniform and efficient search procedures. They can certainly make determining ownership and branch locations easier, since there is only one source and command language to deal with. Once created, fiche or optical disks can be readily replicated for many sites. If the catalog is publicly accessible, some of the identification, verification and location tasks now done by staff can be shifted to the patrons; this allows staff to focus on other steps in the ILL process. But union catalogs will not provide shelf status information or allow the direct placing of holds; these additional features would only be available in an integrated online system.

Systems for placing holds and processing loans that can reduce the staff time needed for these functions have been developed by

the bibliographic utilities. NBC knows from experience that these require substantial and ongoing investments in special hardware, communications, and usage fees. They also require the existence of a single, central database. Microcomputer software is just now beginning to be available which provides the same ease-of-use for ILL; such software addresses many of the repetitive operations (tracking and record-keeping) needed for ILL. Most of these packages (FILLS, MAKEIT/SENDIT, and others) rely on ALA forms or commercial electronic mail systems for transmitting requests and replies, and so do not reduce telecommunications costs. Neither the utilities nor the micro-based ILL software can provide shelf status data or place holds on the local systems, or forward the request on to another owning library.

SUMMARY

It should be clear from the above descriptions that there are a wide selection of technological "solutions" available to libraries today, each with its own distinct mix of advantages and disadvantages. It should also be clear that there is no <u>one</u> solution, because there is no <u>one</u> problem.

Any recommendation of the most appropriate technology for a library to adopt must be based on that organization's determination of which problem they most want to solve.

TABLE A

LEASED LINE CHARGES FOR CIRCULATION SYSTEMS

There are currently five installed circulation systems in NBC, serving nine institutions and most of their branch locations. All of the costs shown are approximate, as the bills were not available for inspection.

Host Institution	Serves	Vendor	Annual line Cost
Sonoma County PDP 11/73	HQ; 8 Branches; (4 unserved)	Gaylord	$ 15,504
Solano County PDP 11/34	HQ; 4 Branches Travis AFB	CLSI	9,660
Marin County PDP 11/73	HQ; 7 Branches; (3 unserved); Mill Valley P.L. and Sausalito P.L.	CLSI	17,916
Napa City-County PDP 11/34	HQ; 2 branches; St. Helena P.L.; Napa Valley Coll.	CLSI	5,796
Sonoma State Univ. PDP 11/34	HQ only	CLSI	none
	31 locations		$ 48,876

TABLE B

LEASED LINE CHARGES FOR INNOVACQ ACQUISITIONS SYSTEM

The NBC headquarters processing center does book ordering for three member libraries through the Innovacq system. Data from Innovacq can be transferred directly into both the Sonoma Gaylord and Solano CLSI circulation databases.

Site	Connections	Monthly Charge
NBC HQ	2 terminals	none
Sonoma Co.	2 terminals	none *
	Gaylord 11/73	none *
Solano	CLSI 11/34	$ 233.00
	1 terminal	233.00
Mendocino	none	na

* Since the two buildings are so close, no telephone lines are needed. There are three hard-wired circuits using short-haul modems.

TABLE C

CURRENT DIAL-UP ACCESS (INTERTIE)

The existing dial-up traffic for dumb terminal access to the CLSI hosts at Solano County, Marin County and Napa City-County has been identified by the originating and destination cities, rather than by institution. The number and cost of dial-access calls, based on a two-week survey in January, 1986, is shown. Those libraries participating in the survey were Mill Valley, Napa, Sonoma, Solano and NBC Headquarters ILL.

From City	To City	# per month	Cost per Minute	Average length
Santa Rosa	San Rafael	28	$ .23	27 min
"	Napa	28	.18	15 min
"	Fairfield	30	.23	40 min
Fairfield	San Rafael	6	$ .24	8 min
"	Napa	8	.12	8 min
Napa	San Rafael	8	*	16 min
"	Fairfield	8	*	16 min
Mill Valley	Napa	4	*	9 min
"	Fairfield	4	*	9 min

Total calls per month	125
Estimated cost per month	500.00
Estimated cost per year	6,000.00 **

* Cost data not received for these libraries.

** This figure is used in the Models, for lack of better data. Future costs, with new participants and procedures, could be quite different.

TABLE D

PROJECTED DIAL-UP ACCESS (INTERTIE)

Estimates of usage were calculated based on FY 1985/86 ILL traffic within NBC (the total number of "borrows" reported to headquarters). The cost figures were arrived at by calculating an additional 20% for un-filled requests, plus another 30% for titles searched in a second database, and then allowing one minute per title @ $.20 per minute. The final figure adds $50.00 per year to cover the "flat" per-call charges (allowing four calls per day at $.05 each). The four libraries and NBC HQ ILL which would be "hubs" in the Models have been totaled separately, since they would not need to use the In-WATS service under those circumstances.

	85/86 borrows	+ 20% no fill	+ 30 % 2d srch	@ $.20 minute	+ $50 year
Benecia	-	-	-	-	$ 50
Lake County	2000	2400	3120	624	674
Mendocino County	4500	5400	7020	$ 1,404	1,454
Mendocino College	100	120	156	31	81
Mill Valley	1200	1440	1872	374	424
Napa Valley Coll.	700	840	1092	218	268
St. Helena	750	900	1170	234	284
San Anselmo	1100	1320	1716	343	393
San Rafael	250	300	390	78	128
Santa Rosa JC	-	-	-	-	50
Sausalito	1600	1920	2496	499	549
Sonoma State	-	-	-	-	50
Travis AFB	-	-	-	-	50
Subtotal					$4,455
Marin County	3000	3600	4680	936	986
Napa City-Co.	2600	3120	4056	811	861
Solano County	3200	3840	4992	998	1,048
Sonoma County	9200	11,040	14,352	2,870	2,920
NBC HQ ILL	7400	8,800	11,544	2,309	2,359
Subtotal					8,174

TOTAL POTENTIAL CHARGES FOR INTERTIE LONG DISTANCE $ 12,639

NOTE ON THE MODELS

The following sections provide Models or case studies of five possible ways to provide linkages between the automated systems in NBC. The Models are based on connections between only five of the six hosts in NBC: the CLSI system at Sonoma State University has been excluded because of policy considerations noted elsewhere. There is no technical reason for it to be left out. The Models also do not reflect any new members or systems that might be added in the future, since insufficient information is available on this. Model I is based on the projected 1987 expansion of Marin County's CLSI system to include the three branches not now connected.

The vendors selected for the Models all have experience in library implementations and, except for Model V, all represent products available now. Other vendors or products may exist or be in development which could offer comparable functions and benefits.

All of the prices quoted, particularly those for hardware, are "list price" and do not incorporate any possible public agency discounts which might be negotiated. Leasing plans are available from all of the hardware vendors. Tariffs for leased telephone lines are subject to change. No costs have been calculated for needed site preparation work (modifications to electrical wiring, air conditioning, etc.).

It should be emphasized that the decisions as to where equipment will be installed were made on the basis of geography and an attempt to minimize the hardware requirements. The configurations would need to be reviewed extensively before any actual implementation was begun, and more input gathered from NBC members on which sites and what numbers of terminals require connection to the network.

MODEL I

Category: Private Telecommunications Network

Product: Doelz Network

Vendor: Doelz Networks, Inc.
9501 Geronimo Rd.
Irvine, CA 92718
(714) 851-2223

Contact: Vic Gill

OVERVIEW

The primary purpose of a Doelz network is to provide better interconnections between the host computers in NBC: currently, the circulation and acquisition systems. The Doelz network will permit any terminal connecting into the network to access any of the host computers, or to "talk" directly to any other terminal. With the additional connections provided by the Doelz network (to Tymnet, Telenet and Uninet), it will be possible to use the same terminals for both circulation and for Intertie, OnTyme, or other remote online services.

Another purpose behind the Doelz network is to provide better network management and reliability. Internal diagnostics identify the location and nature of telephone line problems, significantly reducing the effort and time needed to restore service. A new "ring" configuration of telephone lines allows the Doelz equipment to re-route traffic around any failed circuit, so that service on the network is not interrupted when a single line goes down. Even when the local host is down, the terminals connected to Doelz ports can still be used to access other points on the network.

A third purpose is to control telecommunications costs. The Doelz equipment can significantly reduce both current and future telephone costs, while allowing more terminals to be added. Like a multiplexor, it allows many terminals to share a single leased telephone line. It can also allow terminals to "share" access to a single host port.

The Doelz equipment is "expandable," so that units need not be discarded or replaced when additional capacity is required. The network, as described in the attached detail, has been configured with a minimum number of ports at each site. More ports could be added at any site, to support more terminals.

The Doelz equipment is compatible with other transmission media and protocols, and so would still be useful if California were to implement a radio, microwave or satellite network. For example, Doelz sees no problems in linking their equipment to the UC DLA Packet Radio system if it becomes available; Doelz is familiar with the TCP/IP protocol and can pass it through their devices. Depending on the success and continuation of the Packet Radio project, this might substitute for installing expensive leased telephone lines to remote NBC members. Doelz can provide levels of security/access for designated terminals, if NBC wanted to restrict which stations could go "outside" their local library system and onto the network.

NBC DOELZ HARDWARE INSTALLATIONS

The Doelz network described here would give access to five of NBC's host computers (Innovacq, Gaylord, and three CLSI), support 39 terminals at 16 sites, and provide dial-up access through five ports for all of the remaining NBC members and facilities. (The configuration connects only a limited number of sites, and a limited number of terminals at the headquarters sites, as to do otherwise would be more costly.)

Primary Doelz network "hubs" will be installed at Sonoma County (Innovacq and Gaylord), at Napa County (CLSI), at Marin County (CLSI), and at Solano County (CLSI). These serve to re-direct traffic from designated terminals on those hosts to any other host on the network, or to any terminal that is connected through a Doelz port.

Additional Doelz equipment will be installed at St. Helena, Vallejo/JFK, Novato, and Fairfax. These units will provide connections into the new network for all of their terminals and some of the smaller branches in their vicinity (Calistoga, Springstowne, Inverness, Pt. Reyes, San Geronimo, Bolinas and Stinson Beach). In Sonoma County only the central library will be connected to the Doelz network.

Existing Micom multiplexors in use by Marin, St. Helena and Solano will be re-assigned to other sites within their systems, where they will reduce telephone costs and/or increase terminal capacity. The remaining branches on all the circulation systems will maintain their current telephone lines to their local host, and will not have access to the network except by dial-up.

TELEPHONE LINE CONFIGURATIONS

New leased lines will be installed between the following points: Sonoma County to St. Helena, Sonoma County to Novato, Napa to

Fairfield, Vallejo/JFK to Marin Civic Center. With the links provided by other existing leased lines, there will be at least two pathways for traffic between most points on the network. This will create the basic Doelz "ring" configuration, and permit the Doelz equipment to re-route traffic in case of temporary line outages.

In Marin County there will be substantial re-design of the existing leased telephone lines to the West County branches. Minor re-design will be done in Solano County and Napa County.

Libraries and branches who do not install Doelz equipment will have entry to the new network through dial-up ports at four of the eight Doelz hubs. A toll-free In-WATS number and two ports will be provided into the Sonoma County hub for libraries not within a local calling area for any of the other hubs.

The Sonoma Doelz hub will also provide an out-dial port, for access to the Santa Rosa nodes for Tymnet, Telenet and Uninet. This will eliminate the long distance charges now being incurred by some NBC members when using those services. As an additional benefit, it will allow the Santa Rosa nodes to be used as alternates when the nodes in Napa, San Rafael or Vallejo are down or busy.

ADMINISTRATION AND OPERATIONS

There will be an initial one-time cost to purchase or lease the hardware and to arrange for the installation and upgrading of telephone lines. To achieve maximum effectiveness in terms of NBC's applications, the Doelz equipment should connect as many sites as possible. (Installation between fewer hosts or branch sites than described here would be possible but might not result in the same level of cost reductions, as the telephone lines might not be routed as effectively.)

The network could be implemented in stages if necessary, but this would mean higher installation costs for both hardware and telephone lines. Some sites would need repeated modification as the network grew and changed configuration.

A scheme may have to be devised for allocating the hardware costs among all of the beneficiaries and participants. In Nevada, where Doelz has installed a state-wide system and where there is a similar multi-agency situation, the Las Vegas regional cooperative assesses a fee based on the number of terminals each agency has connected. The money collected is used both to pay operating costs and to purchase additional equipment as it is needed. This assures that ports and telephone lines are made available to whoever wants them, and that costs are shared

equitably.

The primary operating costs to be examined are telephone expenditures. The costs to add the needed new lines should be largely offset by the savings in current line costs. Once the network is in place, future increases in telephone costs should be minimal, since almost no additional lines will be needed to support more terminals. The only substantial increases will be for adding new Doelz sites, which will require changing the route of the network. Since the "ring" of lines will be utilized by all participants, some formula will be needed to allocate these costs as well.

Other operating costs will include maintenance on the equipment, and staff to administer the network. Doelz provides both onsite and remote maintenance services, and has an excellent program for training staff to perform their own local diagnostics and minor repairs. The attached cost estimate for hardware maintenance is based on NBC staff doing most local troubleshooting. If Doelz provides all of the onsite maintenance the charges are higher. Because the Doelz network interconnects multiple hosts and agencies and affects so many existing telephone configurations it needs to be centrally monitored and administered. (Assessments for telephone lines, maintenance and other costs will need to be calculated and billed; planning, training and documentation will be needed; trouble reports will need to be made and follow-up done; etc.). These staff costs are the hardest to estimate, since there are no comparable functions being done now for which itemized costs are available.

Proposed Doelz Network Specifications

I. HARDWARE

a. Primary Doelz network hubs installed at:

Sonoma Co.(Innovacq, Gaylord)	16 port	$16,860
Napa County (CLSI)	16 port	16,680
Marin County (CLSI)	16 port	16,680
Solano County (CLSI)	20 port	22,060
Subtotal		$ 72,640

b. Additional Doelz equipment installed at:

St. Helena	8 port	$11,180
Vallejo/JFK	12 port	16,380
Novato	4 port	5,200
Fairfax	8 port	11,180
Subtotal		$ 43,940

c. Re-assigned Micom Multiplexors

Springstowne	(receives	4-channel	from	Vacaville)
Vacaville	("	8-channel	"	Vallejo)
Calistoga	("	4-channel	"	St. Helena)
Mill Valley	("	4-channel	"	Novato)
Sausalito	("	4-channel	"	Fairfax)

No new costs (already owned) $ 0

d. Modems for dial-up and out-dial ports

Autodial/auto-answer, 1200 bps, 6 @ $500 $ 3,000

TOTAL $119,580

II. OTHER DOELZ COSTS

Software License Fee	8 @ $300 per site	$	2,400
Operator Training	1 One-week course		1,200
Installation	8 @ $400 per site		3,200
TOTAL		$	6,800

III. TELEPHONE ACCESS

a. Connections between host systems

Added leased 4-wire telephone lines:

Sonoma Co. to St. Helena	$ 1,908
Sonoma Co. to Novato	2,280
Vallejo to Marin Civ. Ctr.	2,016
Fairfield to Napa	1,728
Subtotal	$ 7,932

Current leased line costs:

NBC HQ to Fairfield	($ 5,592)
Subtotal	$ 2,340

b. Re-routed and upgraded leased telephone lines

1. Marin Co.

Current line costs from Civic Ctr. to:

San Geronimo	$ 1,800
Point Reyes	1,092
Inverness	1,800
Bolinas	1,800
Stinson Beach	1,800
Novato	996
Subtotal	$ 9,288

Re-routed lines from Fairfax to:

San Geronimo	$ 2,016
Point Reyes	864
Inverness (via Pt. Reyes)	444
Bolinas	1,056
Stinson Beach (via Bolinas)	444
Novato	1,176
Subtotal	$ 6,000

Difference = Savings/year ($ 3,288)

2. Solano Co.

Current line costs from Fairfield to:	
Vallejo/JFK	$ 2,100
Springstowne	4,056
Subtotal	$ 6,156
Re-routed lines from Fairfield to:	
Vallejo/JFK	$ 2,100
Springstowne	444
Subtotal	$ 2,544
Difference = Savings/year	($ 3,612)

3. Napa Co.

Current line costs from Napa to:	
St. Helena	$ 2,100
Calistoga	2,244
Subtotal	$ 4,344
Re-routed lines from Napa to:	
St. Helena	$ 2,100
Calistoga	1,056
Subtotal	$ 3,156
Difference = Savings/year	($ 1,188)

Subtotal = Savings per year ($ 8,088)

c. New IN-WATS Access (at Sonoma County)

Estimates of usage, based on current ILL traffic between NBC members. Others not listed are in local calling areas to Marin, Napa or Solano hubs.

Benecia Public	$ 50	
Lake County	674	
Mendocino Co.	1,454	
Mendocino College	81	
Mill Valley Public	424	
Sausalito Public	549	
Sonoma State	50	
Monthly fees, 2 @ $ 20 x 12	480	
Subtotal		$ 3,762

d. Savings from current Long Distance Dial-up Access

Estimates, based on 85/86 bills.

Tymnet access	$ 1,800	
Intertie calls	6,000	
Subtotal = Savings/year		($ 7,800)
TOTAL		($ 9,786)

IV. OTHER TELEPHONE COSTS

a. Telephone line installation

Leased lines, each termination 28 @ $ 179	$ 5,012	
In-WATS lines, 2 @ $ 70	140	
TOTAL		$ 5,152

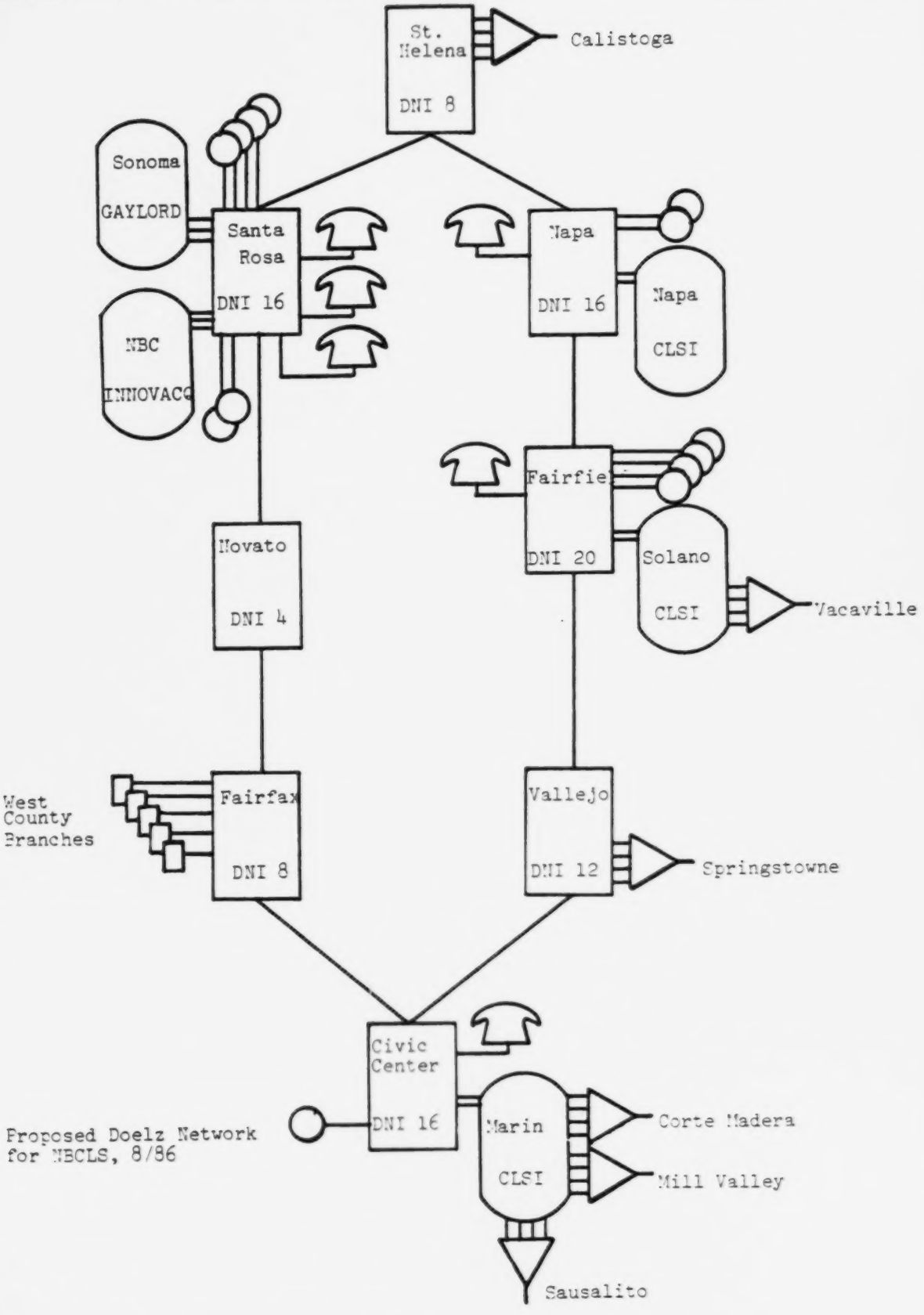
V. SUMMARY OF PROPOSED DOELZ NETWORK

a. One-time costs

1. Hardware (list price)	$ 119,580	
2. Other Doelz costs	6,800	
3. Telephone line installation	5,152	
	TOTAL	$131,532

b. Operating costs, Annual

1. Maintenance @ .25 %/month	3,497	
2. Network administration (.25 FTE)	5,000	
3. Telephone access	(9,786)	
	TOTAL	$ (1,289)



Proposed Doelz Network for NBCLS, 8/86

MODEL II

Category: Private Telecommunications Network

Product: Infotron Network

Vendor: Infotron Systems
2740 Sand Hill Rd.
Menlo Park, CA 94025
(415) 854-9201

Contact: Tom Lemmer

OVERVIEW

Infotron Systems sells multiplexors, data concentrators and data switches. Their hardware has recently been installed in libraries throughout the state of West Virginia, connecting seven local VTLS library systems (running on Hewlett-Packard processors) to a state-wide database maintained by the West Virginia Library Commission.

The Infotron network switch would use a star configuration of telephone lines to create connections to any of the host computers (Gaylord, CLSI and Innovacq) in NBC. The Infotron network will permit any terminal connecting into the network to access any of the host computers, or to "talk" directly to any other terminal, simply by keying in an address code. This has the potential of providing Intertie access and intra-system electronic mail to every library outlet. The network can also allow the circulation system terminals to be used for access to OnTyme or other database services, without the need for added modems or phone lines.

The Infotron installation would give access to five host computers (currently serving over 100 terminals). Many additional terminals could be added to the circulation systems, since the Infotron equipment is expandable and it also permits two terminals to share a single port on the host system. An automatic time-out feature helps to prevent port contention problems; terminals are signed off if there is no activity for a pre-set length of time. The configuration also provides dial-up access for almost any number of additional terminals. The switch can do automatic baud rate recognition, so that dial-up may be at either 300 bps or 1200 bps.

HARDWARE INSTALLATIONS

The NBC Infotron network would consist of a central network switch connected by leased lines to each of the NBC circulation systems. The primary Infotron "hub" is shown in the diagram as installed at NBCLS headquarters. This would consist of the network switch with connections for each of the circulation systems, for Innovacq and for local terminals.

Other Infotron equipment will be installed at the host computers at Sonoma County (Gaylord), at Napa County (CLSI), at Marin County (CLSI), and at Solano County (CLSI). At each of the circulation systems, the terminal connections would be changed so that they were connected through the Infotron statistical multiplexor, rather than directly to the host cpu. This allows each terminal to access the other hosts, through the headquarters switch.

TELEPHONE LINE CONFIGURATIONS

New leased telephone lines will be installed between the primary hub at NBC headquarters and each of the remote units. The two lines now used to connect Innovaq to Solano would be replaced by a single line. The Infotron network does not replace or alter any of the existing local leased telephone lines to the branch sites. Each library retains control over their own local telecommunications. (Infotron has expressed some concern over interfacing with the Gaylord polling protocols, which could limit the Sonoma County connections to headquarters terminals only.) Maintaining the existing branch communications reduces the installation cost of the Infotron network, but precludes any savings on current line costs.

Libraries or branches not connected via the circulation systems will have entry to the Infotron network through dial-up ports at each of the Infotron sites. A toll-free IN-WATS number will be provided into the NBC HQ hub for libraries not within a local calling area for any of the others.

The NBC HQ Infotron hub will also provide an out-dial port, for access to the Santa Rosa nodes for Tymnet, Telenet and Uninet. This will eliminate the long distance charges now being incurred by some NBC members when using those services. As an additional benefit, it will allow the Santa Rosa nodes to be used as alternates when the nodes in Napa, San Rafael or Vallejo are down or busy.

NETWORK MANAGEMENT

An optional component of the Infotron network is their ANM (Advanced Network Manager). This is a software package for the IBM XT or AT which captures, stores and analyzes data on the network traffic flow and performance. While not usually regarded as necessary for a network as small as NBC's, the ANM would provide very useful management reports. For example, it could automatically calculate what proportion of the traffic was being generated by each terminal or each library on the network. Without the ANM, this data would be difficult and time-consuming to obtain.

ADMINISTRATION AND OPERATIONS

There will be an initial one-time cost to purchase or lease the hardware and to install it, and for installation of the new In-WATS and leased telephone lines. The cost of the Infotron equipment will be substantial, whether the network is implemented at all sites at once or in stages, because of the cost of the central switch. To achieve maximum usefulness the Infotron equipment should be installed at as many sites as possible at the same time.

Operating costs will include maintenance on the equipment, telephone line charges, and headquarters staff to manage the network. Infotron provides remote diagnosis and technical support, and offers classroom training for operators. Most maintenance is on a return-to-factory basis. There is a regional maintenance center in San Mateo. (It should be noted that Infotron has a good reputation, even with competitors.)

Some headquarters staff will be needed to monitor network performance, perform trouble-shooting, and provide user support. Since the use of the equipment and the telephone lines will be shared among all of the NBC members, a method of allocating these costs will need to be designed and implemented and staff will be needed for administration and billing.

Linking Automated Systems in NBC — Model II: Infotron

Specifications and Cost Estimates

I. HARDWARE

a. Primary Infotron Network Processor (992NP)

NBC HQ, 6 remote nodes, 12 local ports		$ 30,620

b. Infotron multiplexor equipment (SM632)

Napa County (CLSI)	32 port	$ 7,200
Marin County (CLSI)	64 port	14,400
Solano County (CLSI)	32 port	7,200
Sonoma County (Gaylord)	64 port	14,400
Subtotal		$ 43,200

c. Other equipment

Integral 9600 bps modem cards, Two per remote node = 12 @ $ 1,850		$ 22,200
Auto-answer modems, 1200 bps, One per host = 4 @ $ 500		$ 2,000
Subtotal		$ 24,000
	TOTAL	$ 97,820

II. OTHER Infotron COSTS

a. Advanced Network Manager (ANM)

Software		$ 7,500
IBM PC XT		2,000
Subtotal		$ 9,500

b. Installation

Headquarters		$ 900
Remote sites = 4 @ $ 600		2,400
Subtotal		$ 3,300
	TOTAL	$ 12,800

III. TELEPHONE ACCESS

a. New leased lines:

NBC HQ to Napa Co.	$ 2,304	
NBC HQ to Marin Co.	2,496	
NBC HQ to Solano Co.	2,724	
Subtotal		$ 7,524

b. Current leased lines

NBC HQ to Solano (Innovaq)	($ 5,592)

c. New In-WATS Access (at NBC HQ)

Estimates of usage, based on current ILL traffic between NBC members. Others not listed are in local calling areas.

Benecia Public	$ 50	
Lake County	674	
Mendocino County	1,454	
Mendocino College	81	
Sonoma State	50	
Monthly fees, 2 @ $ 20 x 12	480	
Subtotal		$ 2,789

d. Current Long Distance Dial-up Access

Intertie	$ 6,000	
OnTyme	1,800	
Subtotal = Savings/year		($ 7,800)
TOTAL		($ 3,079)

IV. OTHER TELEPHONE COSTS

a. Telephone line installation

Leased lines, each termination 6 @ $ 179	$ 1,074	
In-WATS lines, 2 @ $ 70	140	
TOTAL		$ 1,214

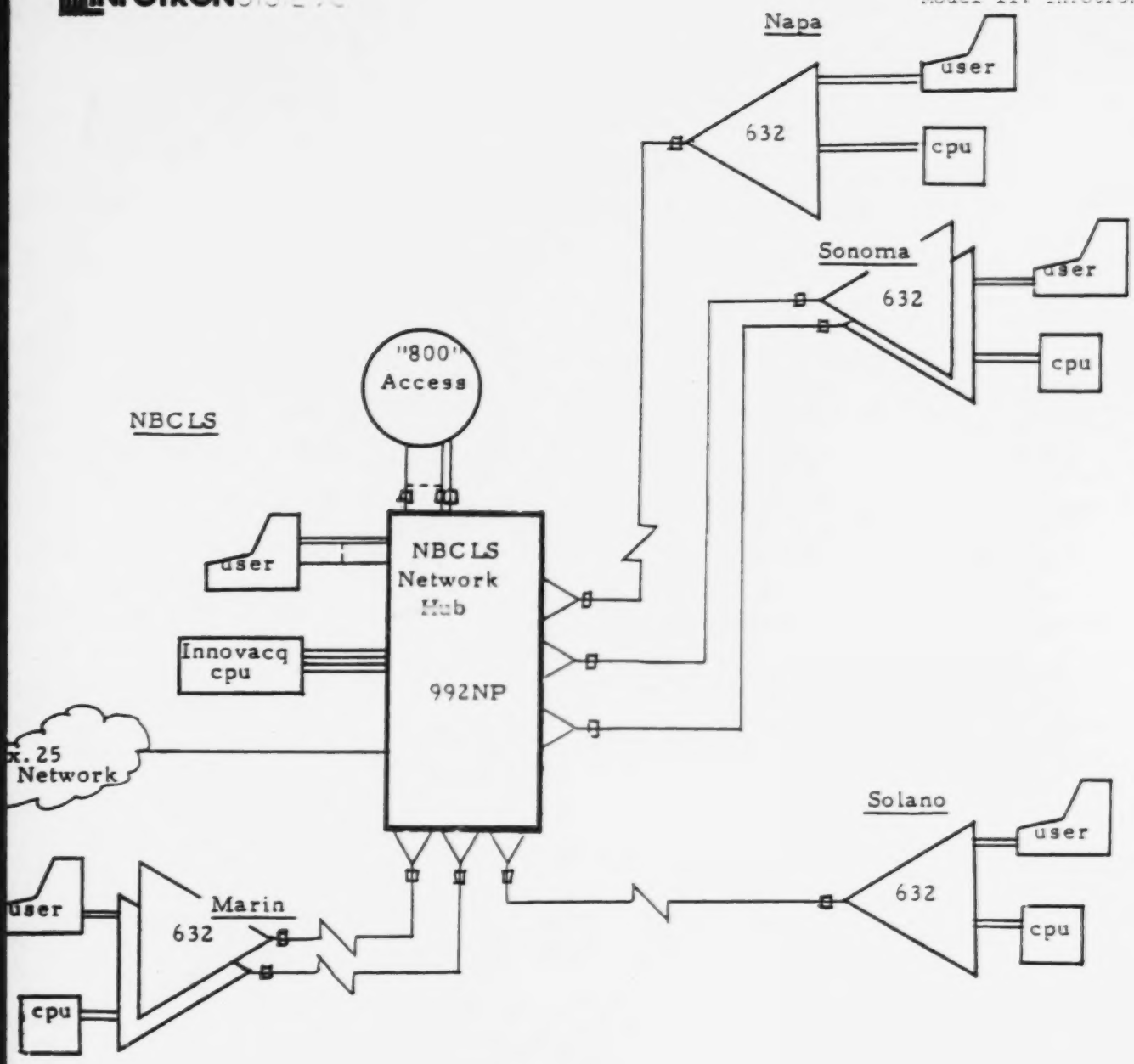
V. SUMMARY OF PROPOSED Infotron NETWORK

a. One-time costs

1. Hardware (list price)	$ 97,820	
2. Other Infotron costs	12,800	
3. Telephone line installation	1,214	
TOTAL		$ 111,834

b. Operating costs

1. Maintenance @ 3% year	$ 2,875	
2. Network administration (.25 FTE)	5,000	
3. Telephone access	(3,079)	
TOTAL		$ 4,796



NORTH BAY COOPERATIVE LIBRARY SYSTEM

Proposed Data Network 7-3-86

39

MODEL III

Category: Private Telecommunications Network

Product: DCA Network

Vendor: Digital Communications Associates, Inc.
One Lagoon Dr., Suite 120
Redwood City, CA 94065
(415) 594-1914

Contact: Scott Averitt

OVERVIEW

The purpose of the DCA network is to provide improved interconnections between the various computerized systems in NBC. Through an intelligent network switch and a "ring" configuration of leased telephone lines, any terminal can select access to any of the NBC hosts (Gaylord, CLSI or Innovacq). Each library would be able to search any of the databases, inform their patron if an item was available or on order, and if desired place a reserve.

The DCA switch automatically re-routes traffic around any telephone line that is malfunctioning or too heavily used. This both reduces down time and improves response time. DCA does not support terminal-to-terminal communications, and so would not replace OnTyme for intra-system electronic mail.

The DCA Network Processor software allows each terminal on the network to be configured independently; each terminal can have its own "menu" of hosts it can access. This means that certain terminals can be assigned permanently to one host, while others can be given access to all NBC hosts. The Network Processors will automatically queue users if there is contention for access to a single port, through a "camp-on" or automatic re-try feature. The need for new host ports can be minimized and more terminals supported, because DCA allows local terminals to share access to a host port.

The network management software allows the operator at the network console to reassign or reconfigure ports remotely, to collect traffic statistics, and do diagnostics on each port as needed. The operating software is menu driven and requires no extensive training to use.

DCA HARDWARE INSTALLATIONS

The primary DCA intelligent switch or Network Processor would be installed at Sonoma County and connected to the Gaylord and Innovacq hosts. Additional Network Processors would be installed at each of the other public library circulation systems (Napa County, Marin County and Solano County). Each Network Processor would be equipped with a System Console terminal. The four Network Processors would connect all of the circulation terminals for that host to the new network.

Each Network Processor would also be equipped with a dial-up port and auto-answer modem. The DCA equipment automatically matches the speed of the originating and destination devices, so that local equipment speed settings do not need to be altered.

TELEPHONE LINE CONFIGURATIONS

The DCA network would require installation of new leased lines to form a ring between the four host sites. The lines would connect Santa Rosa to Napa, Napa to Fairfield, Fairfield to San Rafael, San Rafael to Santa Rosa. The existing lines supporting Innovaq access by Solano County would be removed. All other existing leased lines, from the circulation system hosts to the branches, would be unchanged. (DCA offers software which can support multi-dropped lines without polling from the host; it might be feasible for the libraries with CLSI systems to reduce their line costs by acquiring additional DCA equipment. This optional network configuration has not been investigated yet; it would not alter the network configuration described here.)

Dial-up ports at each host site would provide network access for those libraries and branches who are not connected through a circulation system. A toll-free In-WATS line at the Sonoma County switch would be installed for NBC members who are not in a local dialing area for any of the sites. The new network would eliminate the current Intertie long distance charges, but would not change the existing access to Tymnet.

NETWORK MANAGEMENT

An optional Network Control Concentrator software package is available from DCA. This system, when installed at the headquarters Network Processor, would allow monitoring and management functions for the entire network to be performed from one site. Statistics on traffic and performance could be gathered and compiled into reports automatically, rather than being prepared manually from daily print-outs at each site. DCA provides a three-day training course at their headquarters in Atlanta, Georgia, for NCC system operators.

ADMINISTRATION AND OPERATIONS

Implementation of a DCA network for NBC would involve a substantial initial cost for the hardware. Because the network relies on a ring architecture to provide many of its alternate routing and load balancing features, it would be important to install all of the sites at the same time. A staged implementation would mean higher costs to re-route the telephone lines and reconfigure the Network Processors. DCA will assist with the planning and implementation by having their field engineers do site inspections before the equipment is shipped.

Operating costs consist of hardware maintenance, telephone costs and headquarters staff. Trouble shooting of DCA equipment is made simple through indicator lights on each circuit board; for this reason they recommend a maintenance plan based on NBC staff swapping boards and returning them to the factory for repair. DCA will train NBC staff at the time of installation. Some headquarters staff would be needed to provide service, user support, and network management and billing for the "ring" of telephone lines.

Specifications and Cost Estimates

I. HARDWARE

a. Primary DCA Network Processor (System 355)

Sonoma County (Gaylord, Innovaq, In-WATS), 26 ports		$ 37,425	

b. Secondary DCA Network Processors (System 355)

Napa County (CLSI)	16 port	$ 28,235	
Marin County (CLSI)	26 port	33,455	
Solano County (CLSI)	24 port	33,130	
Subtotal		$ 94,820	

c. Other equipment

Leased-line modems, 2400 bps 8 @ $ 895		$ 7,160	
DCA Spare Parts Kit		6,795	
Auto-answer modems, 1200 bps, 5 @ $ 500		2,500	
System Console Terminal, 4 @ $ 500		2,000	
Subtotal		$ 18,455	
	TOTAL		$150,700

II. DCA NETWORK MANAGEMENT SYSTEM

Network Control Concentrator (NCC)		$ 4,995	
Processing Module (64K)		3,500	
Training (3 days, in Atlanta)		500	
	TOTAL		$ 8,995

III. DCA INSTALLATION

All sites, pre-maintenance coverage, @ 5% net hardware cost (exclude NCC)			$ 7,310

IV. TELEPHONE ACCESS

a. New leased lines:

Sonoma Co. to Napa	$ 2,304	
Sonoma Co. to San Rafael	2,496	
San Rafael to Fairfield	2,976	
Fairfield to Napa	1,728	
Subtotal		$ 9,504

b. Current leased lines

NBC HQ to Solano (Innovaq)	($ 5,592)

c. New In-WATS Access (at Sonoma Co.)

Estimates of usage, based on current ILL traffic between NBC members. Others not listed are in local calling areas.

Benecia Public	$ 50	
Lake County	674	
Mendocino County	1,454	
Mendocino College	81	
Sonoma State	50	
Monthly fees, 2 @ $ 20 x 12	480	
Subtotal		$ 2,789

d. Savings from current Long Distance Dial-up

Intertie	($ 6,000)	
TOTAL		$ 701

V. OTHER TELEPHONE COSTS

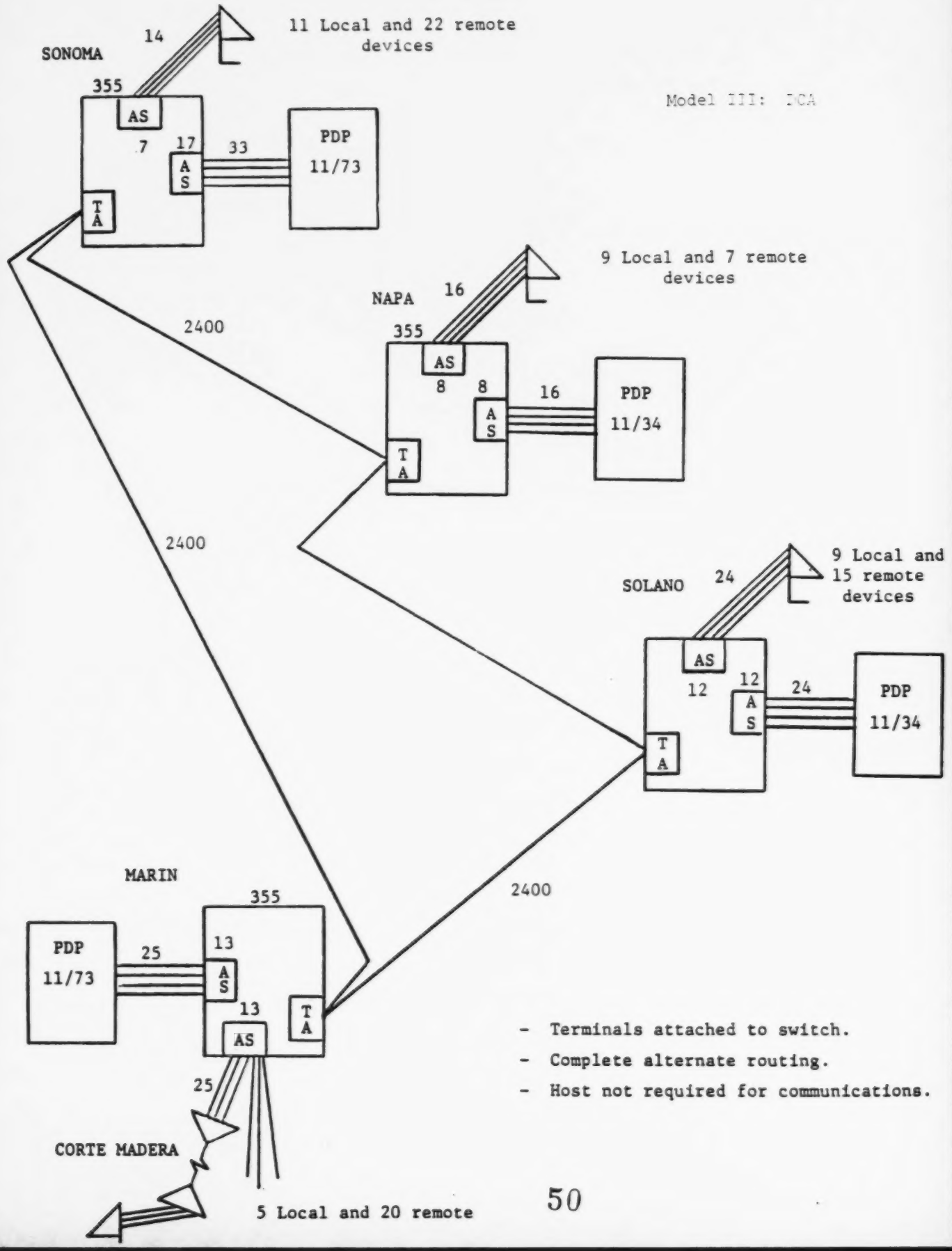
a. Telephone line installation

Leased lines, each termination 8 @ $ 179	$ 1,432	
In-WATS lines, 2 @ $ 70	140	
TOTAL		$ 1,572

VI. SUMMARY OF PROPOSED DCA NETWORK

a. One-time costs		
1. Hardware (list price)	$150,700	
2. Network Management System	8,995	
3. DCA installation	7,310	
4. Telephone line installation	1,572	
TOTAL		$168,577
b. Operating costs		
1. Maintenance @ 2% year	$ 2,924	
2. Network administration (.25 FTE)	5,000	
3. Telephone access	701	
TOTAL		$ 8,625

Model III: ICA



- Terminals attached to switch.
- Complete alternate routing.
- Host not required for communications.

MODEL IV

Category: Front End Translator

Product: IRVING

Vendor: Minicomputer Systems, Inc.
2037 16th St.
Boulder, CO 80302
(303) 443-3347

Contact: Jim McHeyser

OVERVIEW

The Irving project chose to carry the idea of a front end system to the fullest extent. Irving translates both the user's input and the host's output into a common format, and provides on-screen menus and help functions that almost eliminate the need for training. Their system can be used to provide a virtual online catalog for NBC (with patron access, if desired). Although the search of each database is sequential, it is transparent to the user that Irving is searching different kinds of host databases, rather than one. Irving allows full Boolean searching of any indexed element of the records contained in the databases (which may vary from one to another). It is an interactive system -- the user is online to the host, and receives immediate responses.

The Irving software includes an ILL interface module, so that reserves may be placed online on any of the circulation systems from any location. (Policies could be developed to restrict the placing of reserves to non-branch staff only, if desired.) This is essentially the same functions now provided by Intertie and OnTyme, but without the necessity to train staff in the mechanics of multiple access procedures or command structures. Still under development is a software module that will automatically track the ILL traffic being generated by each terminal or each library on the network, and the request response time. The statistics thus captured can be used to calculate TBR internally, and to track in-system borrowing and lending patterns. Without computerized support this data is difficult and time-consuming to obtain, and so has been largely un-available for NBC.

The Irving software has been designed to maintain compatibility with the evolving OSI, SNI and LSP standards for data communication. This means that Irving will not require major

modifications to its programming code in the future, as other vendors of library systems integrate these standards.

IRVING HARDWARE INSTALLATION

The Irving network would consist of a central network switch or "Network Processor," connected by leased lines and statistical multiplexors to each of the four NBC public library circulation system hosts and to the Innovacq acquisitions system. The primary Irving "hub" will be installed at NBCLS Headquarters. This would consist of the Network Processor with twenty-four ports: sixteen for the four circulation systems (four each), two for Innovacq, two for Headquarters terminals and two for the dial-in ports. The remaining two would be held as back-ups.

At each circulation system central site, two terminal connections would be established through multiplexors and leased lines to the Irving Network Processor rather than directly to the host cpu. Two more terminals would be installed at NBC headquarters. These ten Network Terminals would be used to input search queries and to place reserves on any of the NBC hosts. These Network Terminals can be any kind of dumb, asynchronous terminals. They should be all the same type, to avoid additional software charges. Adding more than two terminals at the remote sites would require upgrading the multiplexors to eight-channel models and adding more ports at the Network Processor, and so has not been designed into the NBC model. There is no software limitation on the number of Network Terminals which can be supported.

Only two ports on each host computer would need to be used for Irving. The Irving software will automatically do queuing if more than one user is attempting to access any given host simultaneously. Up to three users can be queued at each host port.

TELEPHONE LINE CONFIGURATIONS

New leased telephone lines will be installed between the primary hub at NBC headquarters and each of the other NBC host sites. Four-channel statistical multiplexors would be used on the lines to Marin, Napa and Solano. Two channels are used by the Network Terminals; two are connected to ports on the host cpu.

Libraries not receiving Network Terminals would have entry to the new network through two dial-up ports at the Irving Network Processor, at NBC. A toll-free In-WATS number will be provided.

The Irving network does not replace or alter any of the existing local leased telephone lines to each library's branch sites;

these telecommunications configurations and charges would be unaffected. Irving would replace the current leased lines between Innovaq and Solano County, the current long distance charges for Intertie access, and the use of OnTyme for ILL's to those libraries with circulation systems (this amount is unknown and has not been estimated).

ADMINISTRATION AND OPERATIONS

As with any project, the Irving network must be examined both in terms of one-time costs and ongoing, operating expenses. There will be an impact on many ILL staff procedures (verifying, locating, requesting and tracking requests) whose costs have not been calculated. Training time should be reduced for all those procedures as well.

There will be an initial one-time cost to purchase or lease the hardware and software and to install it, and for installation of the new telephone lines. To achieve maximum usefulness the Irving system should be installed at as many hosts as possible, although it does not necessarily need to all be done at the same time. If a "staged" implementation is decided on, the Network Processor hardware should still be purchased with enough memory and port capacity for future expansion. MSI encourages libraries to obtain the hardware from a third-party distributor, as their own prices are not discounted at all. Their only caution is to insure that all the equipment meets DEC specifications.

The price of the Irving software is based on the number of hosts it must be customized for; adding a second or subsequent "copy" of a system is less costly than the first copy. This is an advantage for NBC, since we have several hosts of one type. The ILL software in the NBC configuration is designed for staff access only; patron-access ILL (which has a number of extra elements and controls) would cost more.

Operating costs will include maintenance on the equipment (which could be sub-contracted to a third party), maintenance on the software, telephone line charges, and headquarters staff to oversee and manage the network. Irving provides remote diagnosis and technical support which will minimize the need for on-site NBC staff. Some staff will be needed for administration and billing of the shared expenses.

Linking Automated Systems in NBC — Model IV: IRVING

Specifications and Cost Estimates

I. HARDWARE

a. Irving Network Processor

DEC MicroVAX II @ NBC HQ, 10 MB RAM; 24 communication ports		$ 57,800

b. Irving network terminals

Napa County	2 terminals	
Marin County	2 terminals	
Solano County	2 terminals	
Sonoma County	2 terminals	
NBC Headquarters	2 terminals	
	10 @ $ 500	$ 5,000

c. Other hardware

4-Channel Statistical Multiplexors, internal 9,600 bps modems (for Marin, Napa, Solano)	6 @ $ 4,300	$ 17,200
1200 bps auto-answer modems (for In-WATS lines)	2 @ $ 500	$ 1,000
	TOTAL	$ 81,000

II. Irving SOFTWARE

Network System software	$ 32,000	
Bibliographic search software (5)	90,000	
ILL Software (4)	44,000	
Terminal interface (1)	5,050	
	TOTAL	$171,050

III. INSTALLATION (Hardware and Software)

Headquarters	$ 6,000	
Remote sites - 4 @ $ 4,000	16,000	
	TOTAL	$ 22,000

IV. TELEPHONE ACCESS

a. New leased telephone lines

NBC HQ to Napa Co.	$ 2,304	
NBC HQ to Marin Co.	2,496	
NBC HQ to Solano Co.	2,724	
NBC HQ to Sonoma Co.	0	
Subtotal		$ 7,524

b. Current leased-lines

NBC HQ to Solano Co.	($ 5,592)

c. In-WATS Access (to NBC HQ)

Estimates based on current ILL traffic, allowing 1 minute per search and four calls per day. Others not listed have Irving network terminals.

Benecia	$ 50	
Mendocino Co.	1,454	
Mendocino College	81	
Mill Valley	424	
Lake Co.	674	
Napa Valley College	268	
San Anselmo	393	
San Rafael	128	
Santa Rosa JC	50	
St. Helena	284	
Sausalito	549	
Sonoma State	50	
Subtotal		$ 4,405
Monthly fees, 2 @ $20 x 12		$ 480

d. Current Long Distance Dial-up

Intertie	$ 6,000	
Subtotal = Savings/year		($ 6,000)
TOTAL		$ 817

V. OTHER TELEPHONE COSTS

a. Telephone line installation

Leased lines, each termination 6 @ $ 179	$ 1,074	
In-WATS lines, 2 @ $ 70	140	
TOTAL		$ 1,214

VI. SUMMARY OF PROPOSED Irving NETWORK

a. One-time costs

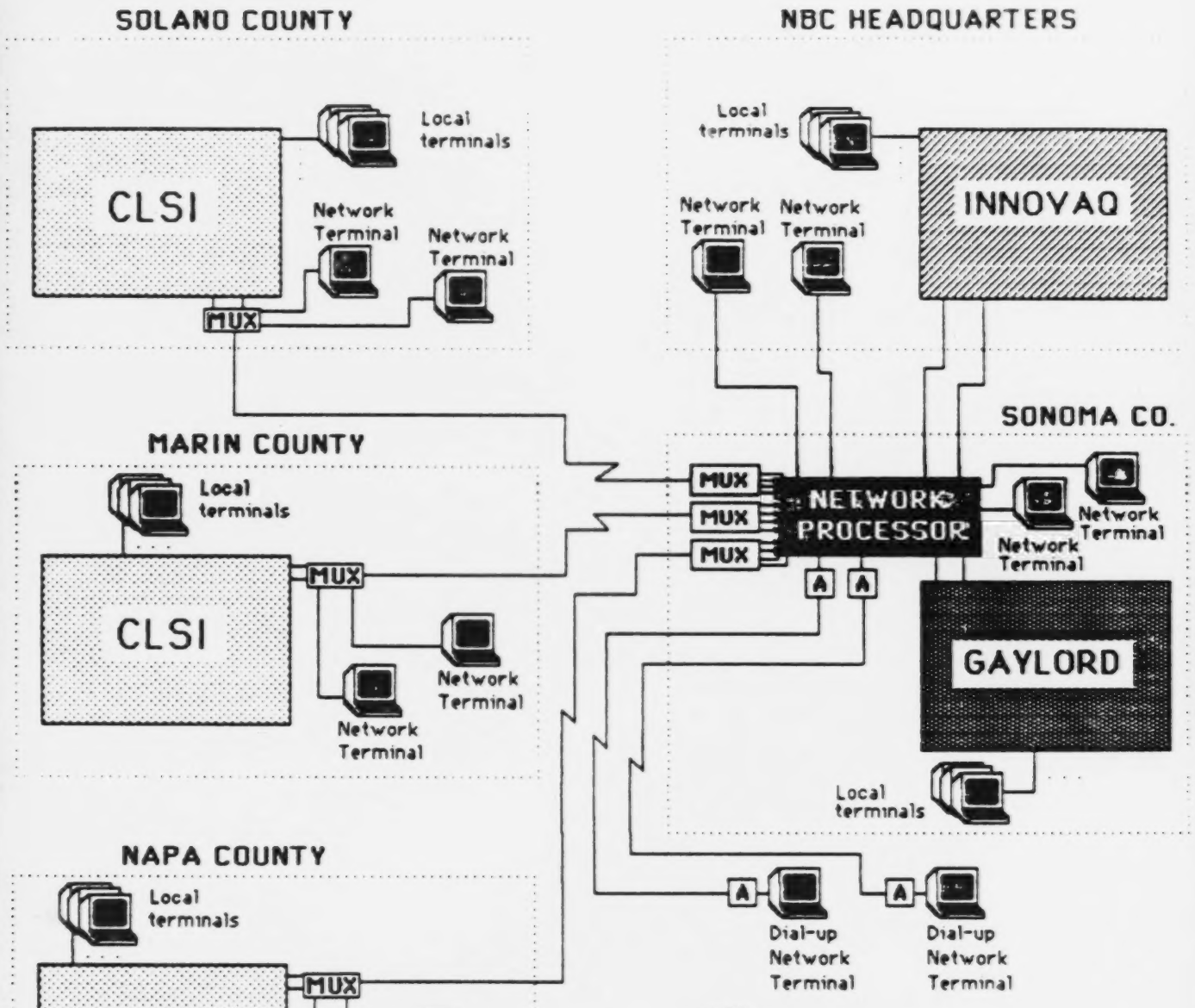
1. Hardware (list price)	$ 81,000	
2. Irving Software	171,050	
3. Irving installation	22,000	
4. Telephone line installation	1,214	
TOTAL		$275,264

b. Operating costs, Annual

1. Maintenance, hardware	$ 10,440	
2. Maintenance, software	14,400	
3. Network administration (.10 FTE)	2,000	
4. Telephone access	817	
TOTAL		$ 27,177

NORTH BAY COOPERATIVE LIBRARY SYSTEM

IRVING NETWORK CONFIGURATION



KEY:

A = ASYNCRONOUS 2400 BPS MODEM COMMUNICATING OVER STANDARD OR WATTS TELEPHONE LINE.

MUX = STATISTICAL MULTIPLEXER WITH INTERNAL SYNCRONOUS MODEM COMMUNICATING AT 9600 BPS OVER LEASED TELEPHONE LINE.

MODEL V

Category: Front End Translator

Product: Regional Telecommunications Support System (RTSS)

Vendor: Library Development Services
California State Library
1001 Sixth St., Suite 300
Sacramento, CA 95814
(916) 322-0361

Contact: John Jewell

OVERVIEW

The Regional Telecommunications Support System (RTSS) is a microcomputer based software package which is designed to facilitate the searching of a variety of library circulation systems by providing a common search language. Development of the software has been funded by the California State Library. Because the project is not complete at this writing, many details of the program's functions, capabilities, costs and availability are still unknown. However, it deserves attention as a unique approach to the problem of learning how to access and use numerous host systems.

RTSS' purpose is similar to that of Irving, but its scope is more limited. RTSS provides a common command translator for only the user's input into a host; the host's output is not altered and so must still be understood and interpreted by the user. It is designed for staff use only, not patrons, and permits only title or title/author searching. RTSS does not allow actual online access to the host -- searches are batched and the results "delivered" a few minutes later. No holds or ILL's may be placed directly on the hosts (although RTSS tries to facilitate transferring the requests to OnTyme through the use of another software package, Sidekick). Statistical reports have been promised as a future development.

RTSS HARDWARE INSTALLATION

RTSS operates on relatively inexpensive IBM PC/AT microcomputer hardware. The software package can be run either directly, by the person operating the microcomputer, or remotely by dialing into the microcomputer from another computer or terminal. In either case, the IBM PC/AT can only serve one user at a time. Because each use of RTSS requires the software to call several of

the hosts in sequence, and then make a return call with the cumulative results if the requests were placed by a remote user, each RTSS IBM PC/AT installation will only be able to serve a limited number of users. NBC would probably require at least six such installations (at the NBC headquarters, Sonoma County, Mendocino County, Napa City-County, Solano County and Marin County ILL departments).

The remote users of RTSS will need to have equipment that can answer the "return call" from RTSS and capture the results into memory. At present, the only ILL departments that can do this are NBC headquarters (who has a Messenger modem) and those who have an IBM PC (Mill Valley, St. Helena and Marin County headquarters). The other public libraries in NBC have only dumb terminals in ILL; these libraries would need to obtain new equipment in order to use RTSS. IBM PC's are probably the most reasonable option, and so have been used for this model. (These remote PC's can not be used for anything else while they are "standing by" for the return RTSS call.) The five non-public-library members of NBC may feel that their ILL activity does not justify the purchase of an IBM PC just for this department; this model reflects only the public library participants.

Because all of the RTSS access to the circulation systems will be made through the dial-up ports on the Gaylord and CLSI hosts, it will almost certainly be necessary to upgrade the speed of those ports with new modems. It would also be advisable to provide two dial-up ports on each host, to avoid contention.

TELEPHONE LINE CONFIGURATIONS

Implementation of RTSS would not affect any of the existing leased line connections within NBC, and would not require any new ones. It would greatly increase use of long distance dial-up connections. Toll free In-WATS lines installed at each of the circulation hosts would help to control costs, and would make RTSS use more equitable for all NBC members.

ADMINISTRATION AND OPERATIONS

RTSS would in many ways be the easiest of any of the systems to implement and to administer. There is no reason why it needs to be implemented all at once; each library could decide independently whether they wanted to obtain the necessary hardware and software to participate. The only coordination or cooperative effort needed is to obtain permission from the four circulation system "owners" to install the additional dial-up ports, modems and In-WATS lines.

Ongoing costs for RTSS would include maintenance on the IBM's, which could be handled by the individual libraries, and maintenance on the software (to keep it current with changes to the circulation systems). It is not known at this time what agent will be responsible for ongoing support of the software. Only a minimal amount of administrative staff should be needed to oversee the maintenance agreements and to do billing for the shared use of the In-WATS lines.

Linking Automated Systems in NBC — Model V: RTSS

Specifications and Cost Estimates

I. HARDWARE

a. RTSS Host Installations

IBM PC/AT, 512Kb RAM, 30Mb disk, Printer, 2400 bps modem

6 @ $ 7,503 — $ 45,018

b. RTSS Remote Access Installations

IBM PC/XT, 256Kb RAM, 20Mb disk, Printer, 1200 bps modem

5 @ $ 4,253 — $ 21,265

c. Other hardware

2400 bps auto-answer modems (for In-WATS lines)

8 @ $ 799 — $ 6,392

TOTAL — $ 72,675

II. RTSS SOFTWARE

RTSS host site software, 5 copies — $ unknown

III. INSTALLATION (Software)

Circulation System Hosts, 4 sites — $ unknown

IV. TELEPHONE ACCESS

a. New In-WATS Access (to each circulation host)

Estimates based on current ILL traffic, allowing 1 minute per search and four calls per day.

Benecia	$ 50	
Mendocino Co.	1,454	
Mendocino College	81	
Mill Valley	424	
Lake Co.	674	
Marin Co.	986	
Napa City-Co.	861	
Napa Valley College	268	
NBC HQ ILL	2,359	
San Anselmo	393	
San Rafael	128	
Santa Rosa JC	50	
St. Helena	284	
Sausalito	549	
Solano Co.	1,048	
Sonoma Co.	2,920	
Sonoma State	50	
Subtotal		$ 8,224
Monthly fees, 8 @ 20 x 12		$ 1,920

b. Current Long Distance Dial-up

Intertie	$ 6,000	
Subtotal = Savings/year		($ 6,000)
TOTAL		$ 4,144

V. OTHER TELEPHONE COSTS

a. Telephone line installation

In-WATS lines, 8 @ $ 70	$ 560

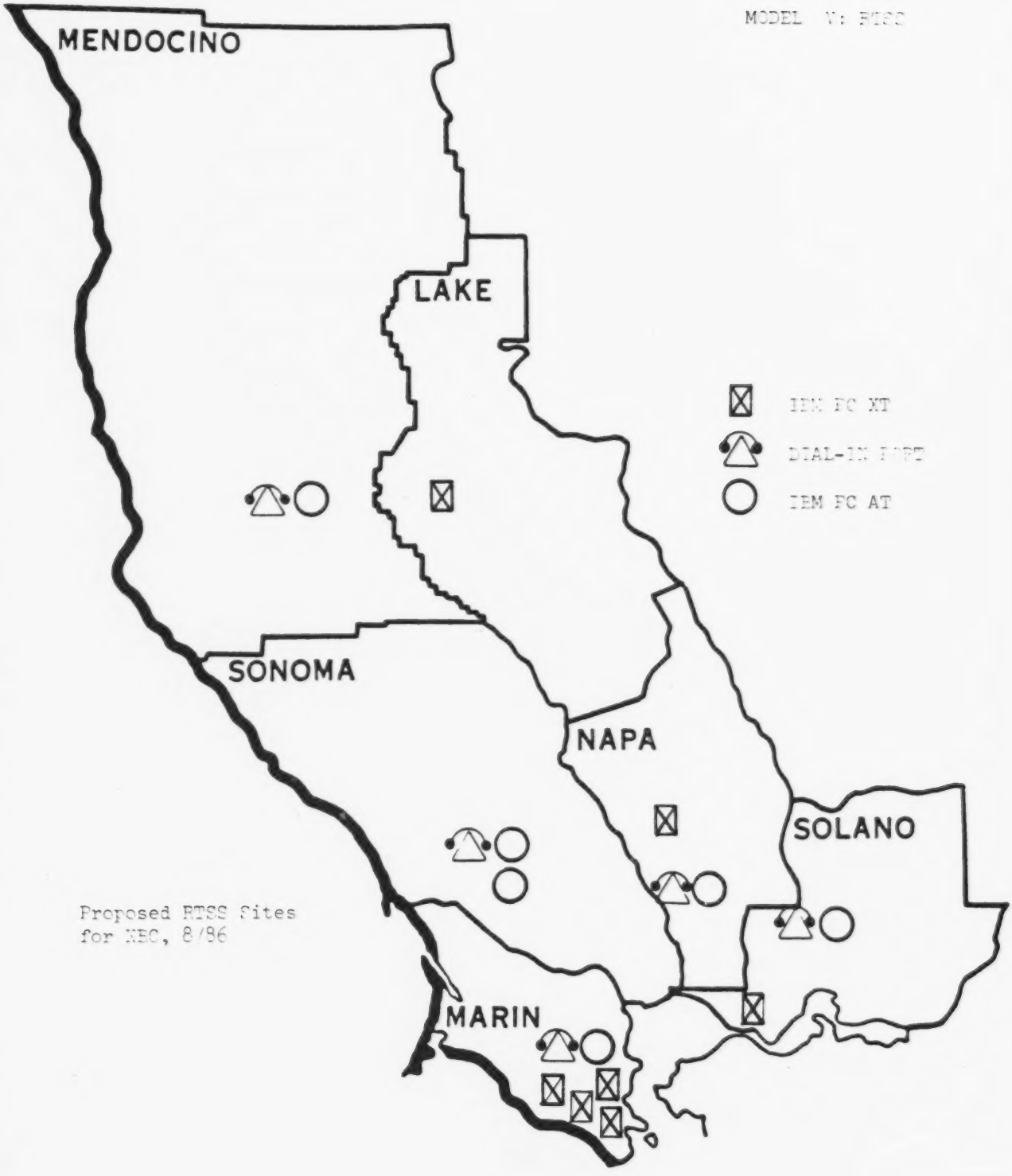
VI. SUMMARY OF PROPOSED RTSS NETWORK

a. One-time costs

1. Hardware (list price)	$ 72,675	
2. RTSS Software	unknown	
3. RTSS installation	unknown	
4. Telephone line installation	560	
	TOTAL	$ unknown

b. Operating costs, Annual

1. Maintenance, hardware	$ variable	
2. Maintenance, software	unknown	
3. Network administration (.05 FTE)	1,000	
4. Telephone access	4,144	
Total		$ unknown


MODEL V: RTSS
MENDOCINO
LAKE
SONOMA
NAPA
SOLANO
MARIN
IBM PC XT
DIAL-IN PORT
IBM PC AT
Proposed RTSS Sites
for NEC, 8/86

APPENDIX: INTERCONNECT PROJECTS AND VENDORS

The following is a list of the people and agencies that were identified as working on linkages between library automation systems. The projects cover a range of approaches, from telecommunications networking equipment to microcomputer interfaces to terminal emulation software.

The list is not intended to be comprehensive or to represent a nationwide survey of system interconnection efforts or the vendors involved, and should not be interpreted as such. Other projects undoubtedly exist, that simply were not identified during the investigation.

Most of those listed were contacted during the course of the NBCLS Telecommunications Project investigations. The project descriptions are based on the information supplied, but details may be inaccurate as circumstances and parameters of projects in progress may change quickly. The contacts were made between March and September of 1986.

The library projects are listed by state; vendor contacts are listed in alphabetical order.

Library Projects Contacted

CALIFORNIA

Clifford Lynch
Division of Library Automation
Univ. of California, Berkeley
186 University Hall
Berkeley, CA 94720
(415) 642-9485

Under an LSCA grant, UC is designing a packet radio network which will cover much of Northern California. The data network will operate at 200Kb and will use the TCP/IP internetworking protocol. The radio frequency bandwidth which UC hopes to use is part of that set aside for Instructional Television (ITSF). Preliminary tests have been done to demonstrate the technical feasibility of using these frequencies; licensing applications are awaiting FCC approval. UC expects the radio network to be tested in 1987. Each library would be equipped by UC with the radio transceiver and the IBM PC/AT "node." The libraries will

have to prepare their own systems to be compatible with the TCP/IP protocol, and determine the applications for which the radio network would be used.

CALIFORNIA

John Jewell
Library Development Services
California State Library
1001 Sixth St., Suite 300
Sacramento, CA 95814
(916) 322-0361

Mark Coleman
Coleman MicroSystems, Inc.
712 Dewitt Ave.
Encinitas, CA 92024
(619) 944-3759

As an LSCA demonstration project, CMI developed an IBM PC/AT microcomputer software package that provides a menu-driven interface for remote batch searching over dial-up phone lines of several library circulation and catalog systems. It was tested at several sites in the Santiago Library System (Orange County, CA) beginning in 1984. [Note: See Model V of this report.]

COLORADO

Susan Fayad
Colorado State Library
Colorado Dept. Education
1362 Lincoln St.
Denver, CO 80203
(303) 866-6736

An analysis of telecommunications options appropriate to the development of a statewide library network was completed and published in 1985, following a recommendation by the Colorado Library Network Development Committee. The study encompassed public, academic, medical and government libraries, and surveyed their telephone services, data communications equipment, library automation, telecommunications expenses, and current and projected traffic levels. Several scenarios were developed using different telecommunications alternatives to build a backbone network connecting existing library hosts in the state. Those examined included private leased voice-grade lines, DDS, public

packet networks, satellite, and use of the State microwave network.

CONNECTICUT

Leslie Burger or Pat Owens
Dept. of Network Services
Connecticut State Library
231 Capitol Ave.
Hartford, CT 06106
(203) 566-3583
(203) 566-2712

Howard Harris
RMG Consultants, Inc.
P.O. Box 1130
Bethesda, MD 20817
(301) 469-5900

CONNLINET issued an RFI in October, 1985 for a six-month study project to determine what technologies were available for linking library automation systems for inquiry and ILL. CONNLINET subsequently decided to hire a consultant to advise them on the "feasibility and cost effectiveness of such a project before (proceeding) with choosing a vendor." The contract was awarded to RMG Consultants in September, 1986. The study will examine linkages for the existing and "near-term" automated systems in Connecticut. The study is expected to be completed in April, 1987.

ILLINOIS

Kathleen Lohman Bloomberg
Library Development Group
Illinois State Library
Centennial Bldg.
Springfield, IL 62756
(217) 782-2994

William Potter
Undergraduate Library
University of Illinois
Urbana, IL 61801
(217) 333-1031

Linking Automated Systems in NBC

David F. Kohl
Public Services, Norlin Library
Univ. of Colorado-Boulder
Boulder, CO 80309-0184
(303) 492-6897

The Illinois Statewide Automation Committee is currently developing plans for future statewide interconnections, and monitoring several projects for possible expansion. The two statewide library telecommunications networks (for the Blind & Physically Handicapped service and for the academic libraries' LCS), which are now separate, will soon be merged onto one network with multiplexors, to reduce the number of telephone lines needed.

A number of projects developed at the University of Illinois, Urbana-Champaign, have been instrumental in interfacing other automated systems. A software program was written by University staff to run on the IBM PC's which are used both as public access terminals for the University of Illinois' online catalog and for access to LCS. The program makes patron-initiated ILL on the statewide LCS network much easier. (The LCS database contains the holdings of 27 academic libraries in Illinois.)

A 1984/85 LSCA project allowed IBM PC's used as terminals on local automated systems at the Lincoln Trails, Cumberland Traila and Lewis & Clark Library Systems to access this same interface program to LCS. The local PC's were equipped with dual communications lines, so that they could be switched between the local system and LCS at UIUC with a single function key. The software did not provide a common command language for use on both systems, and did not store search statements for use on other systems.

A third UIUC project developed IBM PC-based software to handle the Undergraduate Library Reserve Book Room circulation functions and provide management statistics. The system relies on the bibliographic and patron records which are stored in the LCS data base, so that these do not need to be re-created. Data on the course (name, number, instructor) is keyed directly, and is linked to the records for materials held for that course.

Linking Automated Systems in NBC

ILLINOIS

Robert McClarren
North Suburban Library System
200 W. Dundee
Wheeling, IL 60090
(312) 459-1300

Lewis Gordon
P.O. Box 783
Elgin, IL 60121
(312) 695-1455

The "Interconnect Enhancement Program" is an IBM PC-based software package being developed with local funding that will provide an interface to several local library hosts. The program, which builds on the work done at the University of Illinois (see above), will accept incoming author/title requests and then sequentially search for the item on each of the available hosts. The program will automatically distribute the calls among the available hosts, unless the requestor specifies which database to search. Statistical records will also be maintained. Phase I of the project will provide access to the six CLSI installations in the cooperative; Phase II will expand access to local Geac and DRA hosts. Completion is targeted for December, 1986 and April, 1987 respectively. The current design relies on dial-up access; future development may allow for leased line connections.

ILLINOIS

Ulo Ormiste
Chicago Public Library
425 N. Michigan Ave.
Chicago, IL 60611
(312) 269-2900

Brian Winne
Arthur Anderson Co.
33 West Monroe
Chicago, IL 60603
(312) 580-0033

Arthur Anderson has been a consultant to the Chicago Public Library on the installation of their telecommunications network since 1984. The Doelz Network equipment was recommended by CPL's original local system vendor, DataPhase, as a replacement for the equipment of DCA and Infonet. When complete, the Doelz Network

will connect 130 terminals at over 85 locations. Most branches have two terminals; a few have up to eight. There have been numerous problems with the installation, some of which are still unresolved. Some may be related to traffic loads, which far exceeded those anticipated. Others have resulted from unique software and terminal issues. When it is fully functional, the self-healing is expected to be the major benefit received from the Doelz system.

MASSACHUSETTS

Thomas F. Scully
Peabody Institute Library
82 Main St.
Peabody, MA 01960-5592
(617) 531-0100

The Peabody Institute is a member of NOBLE, one of seven consortia that are being linked through a statewide automation plan that is based on the use of CLSI's DataLink. All of the networks must agree to participate in DataLink in order to receive LSCA funds, and must set aside at least three ports on their automated systems for DataLink access. The libraries with CLSI systems report no problems accessing each other's systems, but the link to the University of Lowell's DataPhase system has been less satisfactory. Two of the consortia had not yet chosen an automation vendor in early 1986. The state is providing the needed Hayes modems and WATS lines (about $80,000 in 1985/86).

MASSACHUSETTS

Robert Dugan
Systems Development Office
Massachusetts Board of Library Commissioners
648 Beacon St.
Boston, MA 02217
(617) 267-9400

The state issued Massachusetts: Standard Network Interconnection, with Frank Pezzanite of LSSI, Inc., in November of 1984. The design would have provided a common command language for accessing the nine regional "clustered" circulation systems in the state, through the use of a "back-end" processor. Numerous technical problems with both hardware and software forced the abandonment of the project. The Board may now investigate other interconnect solutions.

Linking Automated Systems in NBC

NEVADA

Nancy Hudson
Las Vegas - Clark County Library District
1401 E. Flamingo Rd.
Las Vegas, NV 89109
(702) 733-7810

Nancy Gwin
Nevada State Library
Capitol Complex
401 N. Carson St.
Carson City, NV 89710
(702) 885-5130

Las Vegas and the libraries in their consortium began installation of Doelz Network equipment on their shared CLSI systems in 1984. Their reasons for selecting Doelz included: frequent problems with telephone lines; rising costs for leased telephone lines; opposition to paying CLSI's high prices for multiplexor equipment. Funding was received to expand the network statewide, using existing microwave channels, to link up several other libraries and systems. The Nevada State Library and CLAN (Central Library Automated Network) have been using Doelz Network equipment since 1985, and plan to continue expanding the statewide network to include additional institutions. They see the ability to add more terminals at every site, without an increase in line costs, as the biggest advantage. CLAN plans to add out-dial access to search services.

NEW YORK

Roberta Cade
Div. Library Development
New York State Library
Cultural Education Center
Empire State Plaza
Albany, NY 12230

Jane G. Rollins
NYSILL Coordinator
New York State Library
Cultural Education Center
Empire State Plaza
Albany, NY 12230
(518) 474-7732

Linking Automated Systems in NBC

A study by Ringgold Management Systems with recommendations for "Redesign of ILL in NY State" was under review in early 1986. Among its recommendations were to maximize access to bibliographic tools and holdings data, eliminate the hierarchical structure, and to use electronic communications for all requests. The New York State ILL network (NYSILL) has replaced teletype terminals with microcomputers at 38 locations. Using a new PC software package called CMS CAPTURE, each location can search the state's database and reformat the bibliographic information into an ILL request for forwarding to up to four sites.

NEW YORK

Jim Stelzle
Wallace Memorial Library
Rochester Institute of Technology
One Lomb Memorial Dr.
P.O. Box 9887
Rochester, NY 14623-0887
(716) 475-6191

A state-funded pilot project began in 1985 to investigate linking the automated systems of the libraries in the Rochester area. These include the University of Rochester, Rochester Institute of Technology, Nazareth College and the Monroe County Public LIbrary. The systems include a DataPhase, two Geac, and an OCLC LS/2000. The 1986 continuation Proposal specifically included investigation of Irving, LSSI's HALN/TALN, microcomputer communications software and Geac "pass-through" software.

OKLAHOMA

Beverly Jones
Planning Office
Oklahoma Dept. of Libraries
200 NE 18th St.
Oklahoma City, OK 73105-3298
(405) 521-2502

State Agency Guidelines for Library Linkage was developed in 1984 as a "performance expectations document" with input from the state library agencies in New York, Ohio, Connecticut and Massachusetts, and two vendors (CLSI and LSSI). Fifteen other state libraries agreed to support the final draft. The document has been recently revised. Oklahoma has no current plans to implement a statewide linkage of local systems, but may begin to

investigate the options within the next year. A statewide microwave network is expected to be available for library uses.

WEST VIRGINIA

Rich Young
Technical Services Dept.
West Virginia Library Commission
Cultural Center
Charleston, WV 25305
(304) 348-2041

A statewide telecommunications network, using Infotron equipment, now connects 7 VTLS host systems including the West Virginia Library Commission (the State library). An Infotron switch allows each site to do host selection and terminal-to-terminal communication. Installation is still in process; no statistics on usage are available. Use now is for cataloging; downloading of bibliographic records from central statewide database. The libraries use a PC with two serial ports (function-key selectable) as terminals; records are downloaded into the PC buffer and then transfer to local VTLS host. Future use for ILL will allow placeahold function. Libraries could use now for search-only access of other hosts but typically don't. Currently 17 sites are online. Three hosts provide dial-in access.

ONTARIO, CANADA

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Libraries & Community Information Branch
Ministry of Citizenship & Culture
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Canada
(415) 965-2696

Harriet Velasquez
UTLAS International U.S., Inc.
1611 North Kent St., Suite 910
Arlington, VA 22209
(703) 525-5940

An RFP was issued early in 1985 for a pilot project for an Ontario-wide network that would facilitate ILL, upgrade communications technology, provide access to online databases and electronic mail, and allow easily collected and reliable

statistics. They received six responses to the RFP (names not given); Utlas was chosen because it "offered a very large data base for bibliographic verification and location, as well as other functionality specific to ILL." IBM PC's were chosen as workstations. The libraries in the pilot project, which was up and running by October, 1985, are using UTLAS for "verification, message creation and message sending" but they do not use the locations listed unless they have been unable to fill the request locally.

Vendors Contacted

Joe Santusuosso
CLSI, INC.
1220 Washington St.
West Newton, MA 02165
(617) 965-6310

DataLink is a software module available to CLSI users at release 26.81 and above. The addition of some hardware (a port, modem, telephone line, slave printers) is required. It allows terminals connected to a LIBS 100 to dial out onto the public telephone network, and thus access other remote systems (such as OnTyme, Dialog, or other circulation databases). A menu of desired services is displayed at the user's terminal; DataLink does all of the needed steps to connect to the remote host. DataLink does not provide any command interface to the other hosts.

Steven Beeferman
DATARADIO, INC.
30 Grove St.
Pittsford, NY 14534

Dennis Barry
Pacific Marketing, Inc.
23216 Bernhardt St.
Hayward, CA 94545
(415) 887-1620

Dataradio manufactures radio modems that can be used for transmitting packetized data signals. Within a regional area this can avoid the cost of leased telephone lines. Dataradio equipment is being used by some libraries for bookmobile links to circulation systems. Hilly territory would require some repeater

stations; coordination with other government agencies for the use of their mountain-top transmitter sites may be necessary.

Scott Averitt
DIGITAL COMMUNICATIONS ASSOCIATES, INC.
One Lagoon Dr., Suite 120
Redwood City, CA 94065
(415) 594-1914

DCA manufactures networking equipment for data communications with almost every type of computer system. The IRMA product line provides micro-to-mainframe interfaces. DCA's switches provide host selection, port contention, alternate routing and centralized network control. They have worked with several library system vendors. [Note: See Model III of this report.]

Vic Gill
DOELZ NETWORKS, INC.
9501 Geronimo Rd.
Irvine, CA 92718
(714) 851-2223

Doelz has developed a communications network system architecture based on a "ring" of intelligent packet switching devices. The system allows for protocol transparency, fault detection and error correction, alternate routing around failed circuits, and other features. The architecture offers substantial savings in leased-line costs, and better reliability than multiplexors. They have installed library networks in Nevada, Arizona (Phoenix Public Library), Texas (Harris County Library), and elsewhere. [Note: See Model I of this report.]

Mike Ridgeway
GEAC COMPUTERS, INC.
515 N. Washington St.
Alexandria, VA 22314
703-836-0225

Geac has developed ZQPASS, software for their library automation systems that allows hardwired Geac terminals to be used in a dial-up mode to access asynchronous, ASCII hosts. The data communications configurations and protocols for each remote host that a library wishes to access are stored by the local Geac processor; users select from a menu of available hosts and be connected through a dial-up modem and telephone line. Five to ten host configurations can be stored. A print spooler allows

the Geac terminals to share access to a printer, eliminating the need for a slave printer on each terminal. Logon and other macros for each host can be stored in Function Keys, if desired. ZQPASS can be programmed to work with most autodial modems.

Tom Lemmer
INFOTRON SYSTEMS CORPORATION
2740 Sand Hill Rd.
Menlo Park, CA 94025
(415) 854-9201

Infotron manufactures data communications networking equipment, including switches, concentrators, modems, multiplexors and protocol convertors. Their switches provide host selection, terminal-to-terminal communications and port contention. Infotron equipment has been installed for the West Virginia statewide library network. [Note: See Model II of this report.]

Frank Pezzanite
LIBRARY SYSTEMS & SERVICES, INC.
HALN/TALN Network
1395 Piccard Dr., Suite 100
Rockville, MD 20850
(301) 428-3400

The Host Access Library Network (HALN) and the Terminal Access Library Network (TALN) models were developed jointly with the Massachusetts Board of Library Commissioners in 1984. TALN was to have been implemented in 1986 but has been postponed pending the outcome of discussions with the Library of Congress. Development work on HALN will not be completed until after the Linked Systems Project is concluded and the resulting national standards are put into place.

Jim McHeyser
MINICOMPUTER SYSTEMS, INC.
2037 Sixteenth St.
Boulder, CO 80302
(303) 443-3347

MSI is the commercial vendor for the Irving system software. Irving is a DEC VAX-based front end software interface that provides a common command language for accessing dissimilar library systems. Irving can be used as an online catalog and for ILL functions, by either staff or patrons. It was developed for and has been installed in a consortium of Colorado libraries; it

has been recommended for expansion to a state-wide network in Colorado. [Note: See Model IV of this report.]

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